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WATER RESOURCES RESEARCH ACT

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HEARINGS
BEFORE THE
COMMITTEE ON
INTERIOR AND INSULAR AFFAIRS
UNITED STATES SENATE
EIGHTY-EIGHTH CONGRESS

FIRST SESSION

ON

S. 2

A BILL TO ESTABLISH WATER RESOURCES RESEARCH CENTERS AT LAND-GRANT COLLEGES AND STATE UNIVERSITIES TO STIMULATE WATER RESEARCH AT OTHER COLLEGES, UNIVERSITIES AND CENTERS OF COMPETENCE, AND TO PROMOTE A MORE ADEQUATE NATIONAL PROGRAM OF WATER RESEARCH.

FEBRUARY 19 AND 20, 1963

Printed for the use of the Committee on Interior and Insular Affairs



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WASHINGTON : 1963

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WATER RESOURCES RESEARCH ACT

TUESDAY, FEBRUARY 19, 1963

U.S. SENATE,
COMMITTEE ON INTERIOR AND INSULAR AFFAIRS,
Washington D.C.

The subcommittee met, pursuant to notice, at 10 a.m., in room 3110, New Senate Office Building, Senator Clinton P. Anderson presiding.

Present: Senators Anderson, Moss, Hayden, Burdick, McGovern, Nelson, Allott, Miller, Dominick and Jordan of Idaho.

Also present: Benton J. Stong, professional staff member, and Jerry T. Verkler, staff director.

Senator ANDERSON. The committee will be in order.

The chairman, who may be supplanted by Senator Jackson shortly, is glad to welcome to the committee its newest member, the distinguished senior Senator from Arizona, Mr. Hayden.

It seems a little strange that after he has served more than 50 years in Congress we finally get on the committee one who has helped us by his work all these years. We are very happy to have him as a most distinguished member.

The hearing today is on S. 2 to bring about the establishment of water resources research institutes, or centers, at land-grant colleges and State universities and other educational institutions, and to make use of centers of competence wherever they exist to promote a more adequate national program of water resources research.

Let me just pause to say I have had an inquiry from one of the land-grant colleges as to whether I really meant land-grant colleges or meant State universities. The land-grant institutions use both "college" and "State university" in their names. The only thing I could explain was that we meant land-grant institutions. We don't attempt to exclude other institutions but I feel this is something that very well could center in the land-grant institutions of the country.

I have been joined in the introduction of the bill by Senator Jackson, the new chairman of this committee and a member of the Select Committee on National Water Resources; Senator Kuchel, the ranking minority member of this committee who served as vice-chairman of the Select Committee on National Water resources; by the majority leader, Senator Mansfield, author of the Senate resolution which set up the select committee in the 86th Congress; by Senators Engle, Hart, McGee and Moss who were members of the select committee, and by Senators McGovern, Gruening, Burdick, Metcalf, Morse, Carlson, Yarborough, Long of Missouri, Bayh, Hruska, Bartlett, McIntyre and Brewster.

In its report on national water resources in January, 1961, the Senate select committee on that subject recommended an expanded, coordinated, scientific Federal research program in the water field.

S. 2 is one part of such a program, designed to make available to agencies responsible for meeting the Nation's water needs highly trained personnel now in related disciplines in the colleges and universities of the Nation, and at the same time to help them train much-needed new personnel in hydrosciences.

When the select committee report was filed, President Kennedy advised Congress that, pursuant to the select committee recommendations, he had asked the National Academy of Sciences to—

study and report on the present state of research underlying the conservation, development, and use of natural resources.

That report was recently made public in the form of a summary statement, supported by seven specialized studies. The Academy report on water resources will be included in the files on the bill before us today.

I pause to say that anybody who wants to take a very good look at a very fine document, I recommend to them this document. Also, I noticed this morning in the Washington Post a very good story on the report of the Council for Science and Technology on water research work and I think it is a fine thing that these reports are coming along.

Significantly, the first conclusion reached by Dr. Abel Wollman, chairman of the Academy's water resources study group, was that the greatest shortage in the water field is experts, and its greatest need, is a—

new generation of well-rounded water scientists ready and able to approach the Nation's multidisciplinary water resources problems in a unified manner as "hydrosciences."

The report added:

Since the primary restraint on the speed with which research may go forward lies in the limited number of competent investigators, immediate support must be provided for university education and in-service training. These, in turn, await the creation of laboratories, offices, and classroom facilities.

This very primary need is, of course, one reason that S. 2 proposes aid to colleges and universities in establishing water resources research centers. Federal research will thereby provide facilities, stimulus, and projects around which a program can be built for training the needed new generation of well-rounded hydroscintists while conducting useful research work.

President Kennedy also directed the Federal Council for Science and Technology to—

review ongoing Federal research in the field of natural resources and to determine ways to strengthen the total Government research effort relating to natural resources.

Pursuant to that instruction, the Federal Council last weekend submitted to the President, and the President yesterday transmitted to Congress, the report of its Task Force on Coordinated Water Resources Research by the Federal Government. In forwarding the task force report to the President, Dr. Jerome B. Wiesner, the President's Science Adviser, who is also director of the Office of Science and Technology and Chairman of the Federal Council for Science and Technology, wrote the President:

The Federal Council concurs in the task force report with minor reservations indicated in the text. It recommends your approval of the attached document,

and also recommends that it be transmitted to Congress for its use in considering both the administration's water resources research program for fiscal year 1964 and the need for new legislation.

Since the report has been submitted as a guide for Congress and particularly for the Interior and the Appropriations Committees and will be in considerable demand by hydroscintists, colleges, and universities across the Nation, it is my hope that it can be printed as a committee print or a Senate document. Meantime, for the use of this committee during the present hearing, we yesterday obtained enough mimeographed copies to put at the place of each of the Senators here today.

Under the circumstances, I shall cite for inclusion in the record of these hearings only one or two brief passages which bear directly on the place of S. 2 in such a coordinated Federal water research program.

First, I would like to congratulate the task force on the report, and not entirely because it supports every argument I have made for S. 2. I was particularly pleased to find the task group was aware of the need by water consumers, including farmers, towns, counties, and States, for the scientific assistance in the water field which might be made available to them through the staffs and through an extension service type of program operated by the universities in each State where the water research centers are located.

The task force report also presents, in a fashion which can be readily understood by those of us who do not have doctors' degrees, a splendid analysis of water research categories and needs, sums appropriated to the various Federal agencies in each of the categories of water research in 1963, and sums requested for 1964.

It is an excellent job, and I congratulate those who produced it.

The task force report, endorsed by the Federal Council and forwarded to us, says:

It is the view of the task group that the Department of the Interior and the Corps of Engineers should be given explicit authority and necessary funds to make grants and contracts with educational institutions for the support of research related to their broad mission responsibilities in the field of water resources. The Department of Health, Education, and Welfare already has a strong extramural program in water. The Departments of Commerce and Agriculture should have adequate funds and should be encouraged to use their authorities for making extramural research grants. The planning and administration of the extramural grant programs of the several departments should be coordinated through the proposed Coordinating Committee on Water Resources Research of the Federal Council for Science and Technology.

The explicit conclusions and recommendations of the task group in regard to legislative needs reiterate the contents of the paragraph I have read and declare it desirable to develop additional centers of water resources research in many universities and to strengthen existing centers and programs. They recommend support for the universities in the precise forms provided in S. 2, including in part, a—

small formula amount to one or more designated research institutions in each State to establish or strengthen the capacity for water resources research, and (2) in part on a matching fund basis, giving consideration to the research potential.

These two types of support are provided in section 100 of S. 2.

The report endorses giving one agency administrative responsibility for the basic formula grant and the matching funds. It qualifies the recommendation, as does S. 2, with the proviso that grants should be

made after consultation with other agencies having substantive interests in the field of water resources.

Without objection, the text of the task force conclusions and recommendations on legislation will be placed in the record.

(The material referred to follows:)

CONCLUSIONS AND RECOMMENDATIONS

New legislation is needed to strengthen substantially the contributions that the universities can make to research and graduate education in water resources.

(a) All agencies concerned with water resources should be able to contract with and make grants to any university, whether or not it is the location of a water research center, in support of agency missions.

(b) It is desirable to develop additional centers of water resources research in many universities and to strengthen existing centers and programs.

(c) In order to accomplish the objectives of (b), some Federal support to each such center on a continuing basis will be necessary in addition to the support provided under (a). The way in which these additional funds would be used should be left to the university itself.

(d) Support to centers should be (1) in part on the basis of a relatively small formula amount to one or more designated research institutions in each State to establish or strengthen the capacity for water resources research,¹ and (2) in part on a matching fund basis, giving consideration to the research potential.

(e) New legislation should give to one agency the administrative responsibilities for carrying out (d) (1), without in any way superseding authorities presently vested in the several agencies.

(f) Similar authority is needed for (d) (2). The administrative responsibility should be vested in one agency which should seek appropriations for this purpose, but the grants should be made in consultation with the other agencies having substantive interests in the field of water resources, which should participate in the drawing up of rules and regulations and criteria for evaluation. Such consultation and coordination as is necessary could be accomplished through the proposed Coordinating Committee on Water Resources Research.

(g) All agencies concerned with water resources should be able to make arrangements with educational institutions to permit Government scientists and engineers to teach and engage in water resources research at educational institutions.

Senator ANDERSON. These conclusions and recommendations can only be interpreted as an endorsement of S. 2.

As a matter of fact, Dr. Jerome Wiesner has written in his comment on the bill, after noting that it includes several very constructive suggestions which he made in regard to the original version, S. 3579 of the 87th Congress:

Based on our studies of the Federal programs and activities in water resources research, I am confident that S. 2 can contribute significantly to the strengthening of the capabilities of the colleges and universities to undertake broadly based research and analysis in the many disciplines bearing on water resources.

Dr. Wiesner will be here to testify at 10 a.m. tomorrow. He could not appear today because of a conflict with a very important meeting called by Vice President Johnson. Dr. Wiesner is anxious that S. 2 set high standards of quality for the research to be undertaken under it. I believe that we can assure him, based on the criteria in the bill to qualify for basic support, and for matching funds or grants, and based on the magnificent record of the land-grant institutions in the field of agricultural research, that the bill assures the high quality of research he very properly seeks.

¹ The Federal Council for Science and Technology qualified its acceptance of this recommendation, agreeing that at least one water resources research or analysis center could be established with Federal grants on a permissive basis in each State, under explicit qualification standards.

Without objection, I shall put in the record at this point the text of S. 2, the reports received from the Department of the Interior, the Office of Science and Technology, the Bureau of the Budget, the General Accounting Office, the Federal Power Commission and other agencies.

(S. 2 and the documents referred to follow:)

[S. 2, 88th Cong., 1st sess.]

A BILL To establish water resources research centers at land-grant colleges and State universities, to stimulate water research at other colleges, universities and centers of competence, and to promote a more adequate national program of water research

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That it is the policy and purpose of the Congress to assure the Nation at all times an abundance of water, both as to quantities and quality, necessary to meet the requirements of its expanding population, and, to help achieve this objective, to stimulate, sponsor, and provide for the conduct of research, investigations, and experiments in the field of water and related resources as they affect water, supplementing present programs, and to encourage the training of scientists in fields related to water by assistance to colleges and universities in the development of water resources research programs.

TITLE I—STATE WATER RESOURCES RESEARCH INSTITUTES OR CENTERS

SEC. 100. (a) There is authorized to be appropriated, for the fiscal year 1964 and subsequent years, for distribution to a college or university in each State and Puerto Rico, established in accordance with an Act approved July 2, 1862 (12 Stat. 503), entitled "An Act donating public lands to the several States and territories which may provide colleges for the benefit of agriculture and the mechanic arts," or such other institutions of higher education as any State shall determine, a sum adequate to provide \$75,000 to each State in the first year, to be increased by \$12,500 each succeeding fiscal year for two years and to continue at \$100,000 thereafter, for the purpose of establishing a collegewide or university-wide water resources research institute, center, or equivalent agency. It shall be the duty of each such institute or center to plan and conduct and/or arrange for a component or components of its college or university to conduct competent researches, investigations, or experiments, of either a basic or practical nature, or both, in relation to water resources, including but not limited to aspects of the hydrological cycle, supply and demand for water, conservation and best use of available supplies, methods of increasing such supplies, economic, legal, social, engineering, recreation, biological, geographic, ecological, and other aspects of water problems, as may in each case be deemed advisable, having due regard to the varying conditions and needs of the respective States and Puerto Rico, to water research projects being conducted by agencies of the Federal Government, and to those related to agriculture being conducted by the agricultural experiment stations, and also having regard to avoidance of any undue displacement of scientists and engineers elsewhere engaged in water resources research.

(b) There is further authorized to be appropriated to the Secretary of the Interior in the fiscal year 1964 the sum of \$1,000,000, increasing by \$1,000,000 each year for four years to \$5,000,000 in fiscal year 1968 and thereafter, which the Secretary of the Interior may use to match, on a dollar for dollar basis, funds made available to State water resources research institutes or centers by the States or other non-Federal sources, to meet the necessary expenses of water resources research projects which could not otherwise be undertaken, including the expense of planning and coordinating regional water resources research projects by two or more State water research agencies.

SEC. 101. Sums available to the States under the terms of section 100(a) of this Act shall be paid to the designated institution or institutions in each State in equal quarterly payments beginning on the first day of July of each fiscal year upon vouchers approved by the Secretary of the Interior. Each such agency authorized to receive funds shall have an officer appointed by its governing authority who shall receive and account for all funds paid to the State under the provisions of this Act and shall make an annual report to the Secretary of the Interior, on or before the first day of September of each year, on work accomplished and the status of projects underway together with a detailed statement

of the amount received under any of the provisions of this Act during the preceding fiscal year, and of its disbursement, on schedules prescribed by the Secretary of the Interior. If any of the moneys received by the authorized receiving officer of any State water resources research agency under the provisions of this Act shall by any action or contingency be found by the Secretary of the Interior to have them improperly diminished, lost, or misapplied, it shall be replaced by the State concerned and until so replaced no subsequent appropriation shall be allotted or paid to such States. Pending a meeting of the legislature of any State, the Secretary of the Interior shall pay sums appropriated pursuant to section 100 of this Act to a qualified institution designated by the Governor of such State.

SEC. 102. Moneys appropriated pursuant to this Act shall also be available, in addition to meeting expenses for research and investigations conducted under authority of this Act, for printing and disseminating the results of such research, retirement of employees subject to the applicable provisions of the Act approved March 4, 1940 (54 Stat. 39), administrative planning and direction, and for the purchase and rental of land and the construction, acquisition, alteration, or repair of buildings necessary for conducting research. The State water resources research agencies are authorized to plan and conduct any research authorized under this Act in cooperation with each other and such other agencies and individuals as may contribute to the solution of the water problems involved, and moneys appropriated pursuant to this Act shall be available for paying the necessary expenses of planning, coordinating, and conducting such cooperative research. Two or more States may cooperate in the designation of a single interstate or regional research institute or center.

SEC. 103. Bulletins, reports, periodicals, reprints of articles, and other publications necessary for the dissemination of results of the researches and experiments, including lists of publications available for distribution by the institutions, shall be transmitted in the mails of the United States under penalty indicia: *Provided, however,* That each publication shall bear such indicia as are prescribed by the Postmaster General and shall be mailed under such regulations as the Postmaster General may from time to time prescribe. Such publications may be mailed from the principal place of business of the institute or center, or from an established subunit of such agency.

SEC. 104. The Secretary of the Interior is hereby charged with the responsibility for the proper administration of this Act, and, after full consultation with other Federal agencies, is authorized and directed to prescribe such rules and regulations as may be necessary to carry out its provisions, including requirement of a showing that agencies designated to receive funds have, or may reasonably be expected to have, the capability of doing effective work. It shall be the duty of the Secretary to furnish such advice and assistance as will best promote the purposes of this Act, including participation in coordination of research initiated under this Act by the State water resources research agencies, from time to time, to indicate such lines of inquiry as to him seem most important, and to encourage and assist in the establishment and maintenance of cooperation by and between the several State water resources research agencies and between the State agencies and the United States Department of the Interior and other Federal establishments.

On or before the 1st day of July in each year after the passage of this Act, the Secretary of the Interior shall ascertain as to each State whether it is entitled to receive its share of the annual appropriations for water resources research under section 100(a) of this Act and the amount which thereupon each is entitled, respectively, to receive.

The Secretary of the Interior shall make an annual report to the Congress of the receipts and expenditures and work of the water resources research agencies in all States under the provisions of this Act and also whether any portion of the appropriation available for allotment to any State has been withheld and if so the reasons therefor.

SEC. 105. Nothing in this Act shall be construed to impair or modify the legal relation existing between any of the colleges or universities under whose direction State water resources research institutes or centers are established and the government of the States in which they are respectively located: *Provided,* That in any State which designates more than one such college or university to have a water resources research center the appropriations made pursuant to section 100(a) of this Act for such State shall be divided between such institutions as the legislature of such State shall direct: *Provided further,* That in any instance where two or more States designate a single interstate or regional institute or

center, the funds of each of the States under section 100(a) may, upon the direction of the States, be paid to the designated agency.

TITLE II—ADDITIONAL WATER RESOURCES RESEARCH PROGRAMS

SEC. 200. There is authorized to be appropriated to the Secretary of the Interior \$5,000,000 in fiscal year 1964, increasing \$1,000,000, annually for five years, and continuing at \$10,000,000 annually thereafter from which he may make grants, contracts, matching, or other arrangements with educational institutions, private foundations, or other institutions; with private firms and individuals; and with local, State, or Federal Government agencies, to undertake research into any aspects of water problems related to the mission of the Department of the Interior, which may be deemed desirable and are not otherwise being studied.

TITLE III—MISCELLANEOUS PROVISIONS

SEC. 300. The Secretary of the Interior shall arrange for the regular advice and cooperation of all agencies of the Federal Government concerned with water problems, of State and local governments and of private institutions and individuals, to assure that the programs authorized in this Act will supplement and not duplicate established water research programs, to stimulate research in otherwise neglected areas, and to contribute to a comprehensive, nationwide program of water and related resources research. He shall make generally available information and reports on projects completed, in progress, or planned under the provisions of this Act, in addition to any direct dissemination of information by the research agencies themselves. Each Federal agency doing water resources research or investigations shall advise the Secretary of the Interior at least once annually of work underway or scheduled by it. The Secretary of the Interior shall classify and maintain for general use a catalog of water resources research and investigation projects in progress or scheduled by Federal agencies, and by such non-Federal agencies of government, colleges, universities, private institutions, firms and individuals as may make voluntarily available information to him: *Provided*, That upon the establishment of a central or general system of cataloging current and projected scientific research in all fields encompassing the cataloging function herein authorized, the President may transfer this function as he determines to be desirable.

SEC. 301. Nothing in the foregoing section nor in this Act is intended nor shall be construed as giving its Secretary or the Department of the Interior any authority or surveillance over water resources research conducted by any other agency of the Federal Government, nor shall it be construed as repealing, superseding, or diminishing existing authorities or responsibilities of any agency of the Federal Government to plan and conduct, contract for, or assist in research in its areas of responsibility and concern with water resources.

SEC. 302. The Secretary of the Interior is authorized to establish in the Department of the Interior a Water Resources Service for the purpose of administering programs authorized in this Act.

SEC. 303. Not to exceed 4 per centum of any funds appropriated pursuant to the provisions of this Act may be used for the purpose of administration. The Secretary of the Interior is authorized to employ a director of the Water Resources Service at civil service grade 18 and, if necessary to obtain personnel competent to administer a program involving scientific knowledge and highly trained staffs, he may employ not to exceed five employees above civil service grade 15 in addition to the number otherwise authorized by law.

SEC. 304. Contracts or other arrangements for water resources research work authorized under this Act may be undertaken without regard to the provisions of section 3684 of the Revised Statutes (31 U.S.C. 529) when in the judgment of the Secretary of the Interior such payments are necessary to facilitate such research.

SEC. 305. Within not more than a year following the fifth year of operation of this Act, the Secretary of the Interior shall prepare and submit to the President for transmittal to the Senate and House of Representatives a comprehensive report on progress and accomplishments under the Act, together with his recommendations on revisions of the Act, and with the independent recommendations of the governing authorities of the State colleges and universities on desirable revisions. This section is not intended to preclude any interim recommendations deemed desirable.

SEC. 306. This Act may be known as the "Water Resources Research Act."

DEPARTMENT OF THE INTERIOR,
OFFICE OF THE SECRETARY,
Washington, D.C., February 18, 1963.

HON. CLINTON P. ANDERSON,
Chairman, Committee on Interior and Insular Affairs,
U.S. Senate, Washington, D.C.

DEAR SENATOR ANDERSON: This responds to your request for the views of this Department on S. 2, a bill to establish water resources research centers at land-grant colleges and State universities, to stimulate water research at other colleges, universities, and centers of competence, and to promote a more adequate national program of water research.

We strongly recommend the enactment of this legislation.

Our views on this subject were set forth at some length in our report of January 3, 1963, on S. 3579, a similar bill introduced in the 87th Congress. We refer you to that report for a more detailed elaboration on the reasons why we feel the enactment of the proposed legislation will make a major contribution toward promoting basic and applied research and investigations of a multidisciplinary character in those areas not now adequately covered under existing programs, augmenting the critically inadequate numbers of experts broadly experienced in the sciences related to water resources, assisting in the assembly and coordination of information on existing and needed research areas, and stimulating non-Federal competent and participation in the solution of water resources problems. We note that a number of changes which were recommended in S. 3579 have been incorporated in S. 2, and we believe that the amendments strengthen and improve the legislation.

It is axiomatic that the availability of adequate supplies of good quality water affects all of man's pursuits. Yet our current use of water is more than 300 billion gallons per day and projections indicate that within two decades the demand may double and will continue to rise in the years that follow. These competing demands for water for its many purposes will render even more critical the need for wise decisions as to its allocation and use. The correctness of these choices in turn will depend, in large measure, on the availability and quality of our knowledge about water in its many aspects. S. 2 will promote the acquisition of this knowledge by supplementing existing Federal and State activities in the field of water research and investigation.

The Bureau of the Budget has advised that there is no objection to the presentation of this report from the standpoint of the administration's program.

Sincerely yours,

STEWART L. UDALL.
Secretary of the Interior.

DEPARTMENT OF THE INTERIOR,
OFFICE OF THE SECRETARY,
Washington, D.C., January 3, 1963.

HON. CLINTON P. ANDERSON,
Chairman, Committee on Interior and Insular Affairs,
U.S. Senate, Washington, D.C.

DEAR SENATOR ANDERSON: This responds to your request for the views of this Department on S. 3579, a bill to establish water resources research institutes at land-grant colleges and State universities and to promote a more adequate national program of water research.

We strongly recommend enactment of this legislation, and suggest certain technical amendments for the consideration of the committee.

The purpose of the bill is well stated in its title. Title I of S. 3579 authorizes the Secretary of the Interior to provide financial assistance to States and Puerto Rico in the amount of \$75,000 a year increasing to \$100,000 after 1966 for the purpose of establishing a collegewide or universitywide water resources research institute at a land-grant college or other equivalent university within the State. Each institute would have the responsibility to plan and conduct a broad program of basic or applied research relating to water resources, taking into consideration the needs of the respective State, water research projects being con-

ducted by Federal agencies, and agricultural research projects being conducted by agricultural research stations. In addition, title I authorizes appropriations to the Secretary of the Interior in the amount of \$1 million the first year, increasing to \$5 million annually the fifth year and thereafter, for grants to the institutes for the necessary expenses of water resources research projects. At least 50 percent of the cost of projects would be financed from funds furnished by the States or other sources.

Title II of the legislation authorizes the Secretary of the Interior to establish a Water Resources Service to administer programs authorized in the act; to encourage Federal cooperation in water problems research; to foster and develop a balanced, nationwide program of water and related resources research and action; to maintain for general use a catalog of water resources research investigation projects by Federal agencies and by non-Federal agencies on a voluntary basis; and generally to make available information on the research work conducted under the authority of the act. In addition, section 201 of title II authorizes the appropriation to the Secretary of the Interior of \$5 million the first year, increasing \$1 million annually for 5 years, for water problems research grants to schools, private foundations, other firms and individuals, and local, State, and Federal agencies, including the State water resources research institutes.

Enactment of the proposed legislation would make a major contribution toward the solution of four problems relating to the Nation's water policy: (1) It would promote the carrying out of urgently needed research work in all areas relating to water resources, particularly with respect to integrating and relating the economic, legal, social, engineering, recreation, biological, geographic, ecological, and other aspects of water problems; (2) it would provide a greatly needed opportunity for the training of scientific personnel for water matters; (3) it would provide a mechanism to assist in the coordination of Federal research efforts and the collation of information on water problems; and (4) it would strengthen non-Federal participation in planning and carrying out water resources conservation and development programs.

Central to the significance of the legislation is the establishment of the water resources research institutes at State universities or land-grant colleges. In this connection, the report of the Senate Select Committee on National Water Resources, in urging the substantial increase and expansion of water resources research activities, stated:

"Note should be made of one problem that shows up when expansion of research programs is considered; namely, the limited availability of competent research scientists. In recent years, fields such as electronics, aeronautics, astronautics, and nuclear energy have been glamorized and supported financially to the point where they are attracting many of the Nation's best research brains. Research in water has received much less public attention. The committee hopes that strengthening of water research programs as discussed herein would help to increase interest in this field. In the near future, additional steps may be necessary to see that our colleges and universities expand their training facilities, and get increasing numbers of competent people to select this field in order that additional research can be carried out" (S. Rept. No. 29, 87th Cong., 1st sess., p. 62).

The key importance of utilizing institutions of higher education for both enlarging our knowledge through research and training scientists and engineers is attested by a distinguished series of authorities. Notable among them is the President's Science Advisory Committee's 1960 Report of the Panel on Basic Research and Graduate Education under the chairmanship of Dr. Glenn T. Seaborg, then chancellor of the University of California at Berkeley and now Chairman of the Atomic Energy Commission.

The Panel stated:

"The central proposition of this report is that science and the making of scientists go best together. This means that when it can be managed, basic research should be done in, or at least in association with, universities. Exceptions to this rule are numerous, of course. Some problems, by their nature, require attack in ways that are not suited to university life; and the work of the geological survey, for example, can hardly be divided among the universities, yet it requires science of high quality, and basic research is essential to the whole undertaking; the same thing is true of many other enterprises of government and industry. Yet we hold to the view that in the absence of special considerations the university is the best place for basic research, and we note that separate installa-

tions which do the best work are, as a rule, those which have a close and effective connection with academic centers: the geological survey, in its intimate relation to academic geology, is an excellent case in point."

Prof. Abel Wolman, Chairman of the Water Resources Study of the National Academy of Sciences-National Research Council found that:

"The most critical shortage in the field of water resources by far is the very real shortage of broadly trained people capable of planning and executing effective research programs. At present, we have no institutional structure in the United States to take care of multidisciplinary research in water. The whole hydrosciences field is now pathetically limited for the tasks involved. To strengthen it will require immediate provision of a program to enlist and train new people in a great many of the disciplines relating to water resources. The ultimate objective should be the development of a new structure and a new generation of well-rounded water scientists ready and able to approach the Nation's multidisciplinary water-resources problems in a unified manner as 'hydrosciences'."

The Committee on Natural Resources of the National Academy of Sciences-National Research Council came to the conclusion that:

"In adapting their research programs and activities to the requirements of the problems outlined in this report, governmental and nongovernmental agencies and institutions should take full advantage of the resources of the universities, contracting out especially those studies for which the universities are uniquely equipped. It should be remembered that an important byproduct of the university research is the training that accompanies it, and the Committee reemphasizes the need for training research workers to deal effectively with the problems relating to natural resources. These problems require closer cooperation between natural and social scientists."

Thus, enactment of S. 3579 would have the two beneficial results of enlisting the scientific and engineering competence of university research in water resources problem-solving, and also of augmenting the critically inadequate numbers of scientists and engineers trained in the sciences related to water resources.

The proposed legislation would build on and utilize the established facilities of the State colleges and universities, thereby taking advantage of a system of educational institutions that for over a century has demonstrated its effectiveness in disseminating and advancing knowledge widely throughout the Nation. Concurrently, the proposed legislation also would enable State universities to strengthen their participation in the sciences of natural resources management. These are persuasive reasons for establishment of broadly based water resources research centers at State universities. At the same time, the long-established activities and concern with agricultural water problems of the Agricultural Experiment Stations should be maintained and developed.

Confidence in the success of this arrangement is enhanced by the State universities' recognition of and readiness to accept the obligations and the opportunities of participation in water resources research activities. At its November 13, 1962, annual meeting, the Association of State Universities and Land-Grant Colleges, composed of 64 such institutions in the 50 States, endorsed and supported the principles that are embodied in S. 3579.

This confirms the desirability of provisions of the bill which leave the decision to establish water resources research centers to the universities themselves as they may be authorized by their State legislatures. Implicit in the bill, furthermore, is an obligation to provide a substantial amount of non-Federal financing for any State water resources research institute. This assures that such centers will be established in response to valid needs recognized by the States in which they are located.

The broad concept of the nature of water resources research explicit in the proposed legislation is of key importance. As defined in S. 3579, such research comprehends the horizon of physical and social sciences and engineering. From our own experience in the Interior Department, we are well aware that the disciplines of economics as well as hydrology, of ecology as well as geology, of law as well as physics are essential elements in developing the knowledge required for dealing with complex water resources problems. It is especially because interdisciplinary research is essential for water resource problems that universities can develop the needed approaches. At universities, the faculties of engineering, agriculture, natural sciences, economic and social sciences, and law can jointly attack the many-faceted research problems.

For like reasons, it is desirable that, in addition to the land-grant colleges and State universities, other universities and research institutions, many of

which have already exhibited a high degree of competence in water resources research, also be aided in water resources research. Title II of S. 3579 adequately meets this objective and makes it possible to enlist competence wherever it exists. The provisions of title II, in fact, make possible assistance in the development of high levels of competence where that is the objective of particular institutions. It should be noted with respect to title I of the bill, that its provisions are applicable to State universities and comparable institutions as well as to land-grant colleges.

Current review of ongoing and projected water resources research of the Federal agencies indicates that assistance to university research such as is contemplated by S. 3579 may be of interest to other Federal agencies as well as to the Department of the Interior. It would be the purpose of this Department to consult closely with other Federal agencies to the end that full consideration will be given to their views and recommendations relative to university research proposals. Thus, until their needs are otherwise provided, university research that other Federal agencies indicate they expect to be of value in the discharge of their assigned responsibilities would be supported to the same extent as proposals related to the missions of this Department. It should be recognized also that enactment of S. 3579 would not in any way preclude or limit assistance to university research, including research by the institutes, by other Federal agencies under whatever authorities they now have or may secure subsequently.

Another important benefit that will accrue from the authorization for assistance to water resources research at State universities, is the encouragement of centers in each State where State and local officials and others concerned in State, local, and regional water resource problems can secure research assistance and information especially pertinent to their particular problem. This will be a major factor in strengthening non-Federal participation in planning and carrying out water resources conservation and development work.

In regard to the detailed provisions of the bill, there are several amendments and comments we suggest to the committee for consideration. First, we feel it would be desirable to make some minor changes in section 100 to afford the States greater flexibility in determining the organizational form and location of the proposed water resources research institutes. Along this line, we suggest that the term "center" be substituted for the more confining word "institute," and that the centers be described as those which are "multidisciplinary in character" rather than "universitywide or collegewide," as this will permit drawing on the contributions of more than one institution in appropriate cases. We also suggest that the bill be so drafted as to permit the State to participate in a regional center serving more than one State if it so desired.

We suggest that the provisions of section 106 for reports and recommendations by the Secretary of the Interior on progress and accomplishments should be made applicable to title II as well as to title I. To this end, we recommend amendment of section 106 on page 8, line 7, by striking the words "title I" and inserting in lieu thereof "this act." Because such amendment would make the provisions of that section generally applicable to the act, it would be appropriate to move the present section 106 to become a new section 303, and to renumber the remaining section accordingly.

The Senate Select Committee on National Water Resources pointed out that improved coordination of Federal water research programs is probably of equal importance with increasing Federal efforts in the most promising fields of research. Some of the provisions of sections 200 and 202 of S. 3579 deal with this urgent but difficult problem by assigning certain responsibilities to the Secretary of the Interior. We, of course, stand ready to make whatever contribution we can. It must be recognized, however, that successful coordination cannot be accomplished through the efforts of one department alone, but can be brought about only through the wholehearted cooperation of all affected Federal agencies acting under the central direction of the President and his office and working through productive Government-wide coordinating machinery.

In considering what might be the appropriate role of this Department under the act in the field of coordination, the distinction between staff and executive functions should be kept in mind. The most important aspect of overall Federal coordination is the determination of the character and content of the research programs and allocation among the Federal agencies of responsibility for performance of the several component parts. This is the executive direction of the program and it is the responsibility of the President; in discharge of this responsibility the President is assisted by the Director, Office of Science and Technology, as provided in Reorganization Plan No. 2 of 1962.

There is wide agreement that certain additional staff services are required for effective coordination. These include: (a) the compilation and dissemination of information about the findings and conclusions of research—a function which has been seriously neglected, as emphasized in recent hearings before the Senate Committee on Government Operations; (b) the current cataloging of ongoing research so that there is readily available knowledge of what is being investigated by whom; and (c) the analysis of research activities in relation to research needs by a full-time professional staff of the highest caliber—that is, ascertaining what are the significant problems whose solution require research. These three elements of coordination, although related to the President's executive direction of the program, are different in character, inasmuch as they are staff rather than executive functions.

Provisions of S. 3579 would authorize organizational arrangements and funding for the three above-described staff activities. They are essential for effective progress of water resources research and there is wide agreement on the need for their performance. The December 21, 1962, letter from Dr. Jerome B. Wiesner, Director, OST, to Senator Anderson states that: "Mechanisms now exist in the Executive Office of the President for assuring necessary coordination of the type contemplated in section 200, which would place coordination responsibilities in a Water Resources Service of the Department of the Interior." Dr. Wiesner's letter describes the measures being considered to accomplish these purposes. The committee may, therefore, wish to amend section 200 in the light of that advice and of the effectuation of Reorganization Plan No. 2 of 1962. Our main concern is to see that these staffing functions are adequately provided for, and we feel that satisfactory staffing assignments can be worked out after consultation among the parties concerned.

An additional item that warrants attention is assurance that the authorizing legislation permits continuance of support of research activities beyond the single 12-month period of an annual appropriation. Most worthwhile research needs to extend over several years so as to afford adequate opportunity to pursue promising leads. Serious research often will not be undertaken by qualified scientists and engineers unless there is reasonable expectation of multiyear support. It is equally true that universities cannot be expected to provide laboratories or other facilities except on the basis of a continuing program. In order to dispel any uncertainty on this score, we recommend that title II be amended by inserting on page 9, line 2, after the word "years," the following: "and to continue at the rate of \$10 million annually thereafter."

The provisions in the act authorizing Federal financial assistance to private research projects raise the question of protecting the public interest in any patents which might be developed as a result of such research. Three recently enacted statutes authorizing the Department to contract for research in the fields of coal, saline water, and helium require that patents and other results of Government-financed research be available to the general public royalty free. A similar provision would appear to be appropriate for inclusion in the bill.

While the Virgin Islands, Guam, and American Samoa are not eligible for assistance under title I, we hope that in years to come the fledgling institutions of higher learning in these territories will develop to the point where they would be qualified to assume the responsibility for establishing water resources research institutes, and the necessary legislative amendments can be made at that time. Meanwhile, we note that appropriate entities in the territories would be eligible to receive research project assistance under section 201.

Enclosed is our 5-year estimate of personnel and other costs as required by the act of July 25, 1956 (5 U.S.C. 642a). In preparing these estimates, we have anticipated that the centralized administrative staff, although high in caliber, would be quite small in numbers. It also is our intention to rely heavily on an extensive series of highly competent consultants for guidance in selection of research proposals for assistance. This would bring to the Government the best guidance in the various scientific and engineering fields available outside of the Federal Government. In general, there is reason for confidence that the expenses of program administration can be held within the limitations of the bill, although we recognize that expenses such as those that fall in the cataloging and dissemination functions might in time develop to the point where the 4-percent limitation contained in section 300 might have to be increased.

In conclusion, in addition to enthusiastically urging enactment of S. 3579, we want also to concur fully in the view that it would be complementary to continued and enlarged research by Federal scientists employed in the several

departments. Valuable as will be the advances in water resources knowledge that flow from the program contemplated by S. 3579, such "extra-mural" research in universities can in no sense substitute for the ongoing research of the agencies, including contract research that is an integral part of agency programs. Along with strengthening research at universities, we should concurrently strengthen "in-house" research of the Federal agencies. Certainly there are plenty of problems for both groups.

The Bureau of the Budget has advised that there is no objection to the presentation of this report from the standpoint of the administration's program.

Sincerely yours,

STEWART L. UDALL,
Secretary of the Interior.

S. 3579, A BILL TO ESTABLISH WATER RESOURCES RESEARCH INSTITUTES AT LAND-GRANT COLLEGES AND STATE UNIVERSITIES AND TO PROMOTE A MORE ADEQUATE NATIONAL PROGRAM OF WATER RESEARCH

Estimated additional man-years of civilian employment and expenditures for the first 5 years of proposed new program

	19cy	19cy+1	19cy+2	19cy+3	19cy+4
Estimated additional man-years of civilian employment:					
Supervisory and professional.....	4.5	7	9	11	12
Clerical.....	8.0	13	18	22	25
Consultants (w.a.e.).....	2.0	13	14	15	16
Total, estimated additional man-years of civilian employment.....	14.5	23	31	38	43
Estimated additional expenditures:					
Personal services.....	\$165,000	\$265,000	\$355,000	\$425,000	\$475,000
All other.....	6,700,000	10,500,000	14,000,000	16,400,000	18,500,000
Total, estimated additional expenditures.....	6,865,000	10,765,000	14,355,000	16,825,000	18,975,000

¹ 1 man-year equivalent to 300 man-days.

EXECUTIVE OFFICE OF THE PRESIDENT,
OFFICE OF SCIENCE AND TECHNOLOGY,
Washington, D.C., January 1, 1963.

HON. CLINTON P. ANDERSON,
Chairman, Committee on Interior and Insular Affairs,
U.S. Senate, Washington, D.C.

DEAR SENATOR: I am pleased to respond to your request for my comments on S. 2 aimed at promoting a more adequate national program of water research.

In my letter to you of December 21, 1962, I commented extensively on its predecessors, S. 3579 introduced in the 87th Congress. A copy of that letter is attached since it states my views concerning the objectives and general character of the legislation needed to accomplish the purposes of that bill which are similar to those of S. 2. I am pleased to note that the revisions incorporated in the latter bill reflects favorable consideration of many of the points raised in my letter.

Based on our studies of the Federal programs and activities in water resources research, I am confident that S. 2 can contribute significantly to the strengthening of the capabilities of the colleges and universities to undertake broadly based research and analysis in the many disciplines bearing on water resources. I wish to reiterate, however, that the Government should adhere to high standards of quality in the administration of the program envisaged in S. 2. It would seem desirable to have specific language in the bill to this effect in order to make it clear to both the Government and the universities that this is the intent of the Congress.

Sincerely yours,

JEROME B. WIESNER.

EXECUTIVE OFFICE OF THE PRESIDENT,
OFFICE OF SCIENCE AND TECHNOLOGY,
Washington, D.C., December 21, 1962.

HON. CLINTON P. ANDERSON,
Chairman, Committee on Interior and Insular Affairs,
U.S. Senate, Washington, D.C.

DEAR SENATOR: This is in response to your request for my views on the water resources research bill (S. 3579) of the Senate Committee on Interior and Insular Affairs. I appreciate the opportunity to comment on the scientific and technical aspects of the bill.

Legislation along the general lines of the bill could serve a useful purpose in providing additional authority and funds for a concerted approach to the problems in the field of water resources research. To carry out the additional research in water resources needed to assure an abundance of water of adequate quality requires augmentation of research in the universities to more effectively utilize their research potential, to bring to bear the several interrelated disciplines bearing on water resources, and to train the new scientists and engineers sorely needed for research and teaching in this field.

Some half dozen Federal departments and agencies have major responsibilities in water resources requiring research. They support research in their own laboratories and in the universities in accordance with their missions. The extent of such support is quite modest in relation to the needs for better understanding of the problems involved. Shortages of highly trained manpower would particularly limit the expansion of creative research in this field even if more funds were made available. There are many different kinds of research needed in water resources ranging from basic scientific research, on the one hand, to applications engineering and economic analyses on the other. There is a special need for research and analysis that draws on the combined talents of scientists, engineers, social scientists, economists, lawyers, and others. There is also a need at local levels for technical analyses and studies to apply the findings of research. The research problems may be national or highly local in character.

As I perceive the broad objective of legislation along the lines of the bill, it should be aimed at supplementing existing agency arrangements for support of water resources research by fostering university planned and initiated research and investigation that draws on the diverse scientific, technical, and other skills throughout the schools and departments of the university or college: that is directed at State, regional, or National water resources problems; and that is not shaped by the mission of a particular Federal agency providing financial support. Federal support of a program of this nature would need to be administered in the broad national interest and in the interests of all the Federal agencies having missions in water resources.

I would hope that the flavor of the foregoing remarks could better be reflected in your bill so that there would be no misunderstanding as to its objective to supplement existing forms of support in certain important respects. On the other hand, by strengthening and expanding universitywide and college-wide capabilities for water resources research, additional research potential would be made available to all of the interested Federal agencies.

WATER RESOURCES RESEARCH INSTITUTES

Title I of the bill recognizes the need for financial incentives to encourage special organizational arrangements for the creation of universitywide research centers, whereby workers in several disciplines can be brought together in a common approach to problems of water resources research. There is provision for "seed money" to assure sustained research at such centers on problems deemed important by the universities and States. The sharing feature of the bill is desirable to provide tangible expression of both State and university interests.

While supporting these measures, I would like to offer several suggestions with respect to title I:

(a) I question whether the organizational unit for carrying out water resources research at the universities should be specified in legislation as water resources research "institutes," since the bill's objective is to create within the designated institution an organizational framework for advancing universitywide research in water resources. In some instances an institute for water resources research might fit into the organizational pattern of the educational

institution. In other cases, it may be preferable to strengthen the competence where it resides in the university, and to bring it into focus on water resources problems through other types of organizational arrangements than research institutes. In any case, it would seem undesirable to require a particular form of university organization for research in water resources as a condition for Federal support. Considering the uniqueness of each university in terms of its organization and research capabilities, the form of organization should be determined by the institution.

(b) In view of the limited availability of technical manpower to support university centers for water resources research, and the regional nature of many water resources problems, it would seem highly desirable in section 100(a) to authorize and encourage States to join together in support of a single research center where their common interests would be better served.

(c) Although section 100 would cover arrangements "substantially equivalent" to land-grant institutions, it is important to adhere to the principle that water resources research centers be located at the most qualified institution, whether public or private.

(d) The provisions of title I would need to be administered so as to avoid sudden and excessive pressures to establish more water resources research centers than can be staffed with qualified scientists and engineers. The ongoing water research effort should be protected from disruptive dislocation of the meager number of scientists and engineers working in this field from one institution to another, particularly from Government laboratories where much of our scientific competence in this field now resides. Thus, consideration should be given to revision of section 104 of title I to make it clear that the responsible agency would have discretion to deny a grant to an institution where the purposes of the grant under section 100(a) would not be achieved. The agency should also clearly have discretion to approve or disapprove proposals for matching grants for research support under section 100(b), to be exercised in accordance with criteria developed in consultation with the other Federal agencies engaged in water resources research. There should be ample authority to insist on high standards of quality in judging research capabilities deserving of Federal assistance.

(e) Although the administrative responsibility for implementation of the act will need to be placed in a single agency, all agencies having missions in water resources should have the right to participate concerning policies, criteria for evaluation, rules, and regulations. This is required because a substantial amount of research on various phases of water resources at the universities is being supported by a number of Federal agencies through a variety of arrangements; and this support should be continued and strengthened. The act will need to be administered with careful consideration of the interests of all Government agencies in view of the shortage of scientists and engineers in the water resources field and the many research needs of the Government. Section 104 should recognize the interests of other agencies in the assignment of responsibility for coordinating and guiding research under title I and for assisting cooperation between the institutes and the Federal Government.

EXTRAMURAL RESEARCH GRANTS

In order to satisfy the research needs in water resources and facilitate the training of new scientists, there needs to be augmentation of present types of support of research and education at the universities in fields relating to water resources. Such research should be supported by all of the Federal agencies engaged in water resources research, and they should all have ample authority for this purpose. At the present time, the Department of the Interior does not have sufficiently broad authority to make research grants and contracts with educational institutions. In this regard, section 201 of the bill is desirable. Since the other agencies have coordinate responsibilities and interests, the language of section 201 needs to be restricted to provide the Department of the Interior with a significant extramural research program for the purpose of serving its own mission responsibilities in water resources.

COORDINATION

Mechanisms now exist in the Executive Office of the President for assuring necessary coordination of the type contemplated in section 200, which would place coordination responsibilities in Water Resources Service of the Depart-

of the Interior. With the passage of Reorganization Plan No. 2 in the last session of Congress, the Office of Science and Technology has been given responsibilities for assisting the President in the coordination of Federal science programs. Working closely with the Federal Council for Science and Technology, The OST can provide the focal point for encouraging and bringing about such coordination. Serious consideration is being given to the establishment of a coordinating committee on water resources research under the Federal Council and to the creation of a high caliber analytical staff for support of the work of the Federal Council in developing a coordinated water resources research program.

The inventory of current efforts in water resources research contemplated in section 202 is needed. However, legislation is not required for this purpose; nor would it be desirable to make this a statutory responsibility of a given department or agency. This is a matter for consideration by the Federal Council for Science and Technology in the context of the overall management of scientific and technical information within the Government.

The Committee on Interior and Insular Affairs has made an outstanding contribution to public understanding of the serious nature of the water resources problem, and it has shown a way for meeting this problem through research and education. The committee's work has been of great value to the executive branch in developing a coordinated research program.

We are grateful to you and your committee for your leadership and for the thorough and understanding manner in which you have approached this complex subject.

Sincerely yours,

JEROME B. WIESNER.

FEDERAL POWER COMMISSION REPORT ON S. 2, 88TH CONGRESS

A bill to establish water resources research centers at land-grant colleges and State universities, to stimulate water research at other colleges, universities and centers of competence, and to promote a more adequate national program of water research.

This bill, if enacted, would be known as the Water Resources Research Act. Title I of the bill would authorize the establishment of a state water resources research institute or center at a land-grant college or university or other institution of higher education in each state for the purpose of conducting research in relation to water resources. In addition, the Secretary of the Interior would be authorized to match funds made available to such institutes or centers by the states or other sources to meet the expenses of specific water resources research projects. The proposed water resources institutes would be patterned after the agricultural experiment stations currently located at land-grant institutions.

Title II of the bill would authorize annual appropriations over a 5-year period to the Secretary of the Interior from which fund he would be empowered to make grants, contracts, matching, or other arrangements for research into water problems by educational institutions, private foundations, and other institutions, private firms or individuals; and with local, State, and Federal Government agencies.

The administration of the various research programs authorized by the proposed enactment would be under a Water Resources Service to be set up by the Department of the Interior.

The bill makes specific mention of certain types of research which would be conducted, including the hydrological cycle, supply and demand for water, conservation and best use of available supplies, methods of increasing such supplies, economic, legal, social, engineering, recreation, biological, and other aspects of water problems.

The bill specifically states that the research programs authorized thereby are designed to supplement present programs and are not intended to supplant the work of various other public and private agencies engaged in water resources research. Section 301 expressly provides that the proposed legislation shall not be construed as giving the Secretary of the Interior "any authority or surveillance over water resources research conducted by any other agency of the Federal Government, nor shall it be construed as repealing, superseding, or diminishing existing authorities or responsibilities of any agency of the Federal Government to plan and conduct, contract for, or assist in research in its areas of responsibility and concern with water resources." In this connection, it also

should be noted that the Secretary, in prescribing appropriate rules and regulations for administering the act, would be required to do so only "after full consultation with other Federal agencies."

It appears, therefore, to be the intent of this legislation that the work of the research institutes or centers and any other research programs which may be initiated under this proposal be closely related to and carried out coordinately in cooperation with the work of existing Federal agencies such as the Corps of Engineers, the Bureau of Reclamation, the Weather Bureau, Geological Survey, Public Health Services, Bureau of Outdoor Recreation, and the Office of Saline Water.

Pursuant to the provisions of the Federal Power Act, the Commission issues licenses to citizens, corporations, States, and municipalities authorizing the construction, operation, and maintenance of waterpower projects on lands of the United States and on streams over which the Congress has jurisdiction. Closely related to the licensing activities are the Commission's responsibilities under the Flood Control and River and Harbor Acts to advise and make recommendations to the Federal constructing agencies on power matters. In both activities the Commission makes basinwide investigations and studies of the possible multiple-purpose uses of rivers and their tributaries. Thus, the Commission has an important interest in all phases of water resource development and in research related thereto. Any effective measures designed to further research in this field would be of value to the Commission.

The Commission therefore supports the purposes and objectives of this bill.

FEDERAL POWER COMMISSION,

(Signed) JOSEPH C. SWIDLER, *Chairman*.

EXECUTIVE OFFICE OF THE PRESIDENT,

BUREAU OF THE BUDGET,

Washington, D.C., February 15, 1963.

HON. CLINTON P. ANDERSON,
Chairman, Committee on Interior and Insular Affairs,
U.S. Senate, Washington, D.C.

DEAR MR. CHAIRMAN: This is in reply to your letter of January 24, 1963, requesting the comments of this office with respect to S. 2, to establish water resources research centers at land-grant colleges and State universities, to stimulate water research at other colleges, universities and centers of competence, and to promote a more adequate national program of water research.

Under title I of the bill, funds would be authorized for distribution by the Secretary of the Interior to land-grant or other State designated institutions for the purpose of establishing water resources research institutes. Additional funds would also be authorized which the Secretary could use to match funds made available to the institutes by the States or by other sources.

Title II of the bill would authorize additional appropriations to the Secretary of the Interior from which he could make grants, contracts, or other arrangements with Government or private agencies and institutions. Title III contains certain miscellaneous provisions related to the administration of programs under the bill, including authority for the Secretary of the Interior to establish in the Department a Water Resources Research Service.

We recently provided views on a predecessor bill, S. 3579, to your committee and also informally suggested alternative language on certain provisions of that bill to committee staff. It is noted that a number of our comments on S. 3579, as well as those of other agencies, were taken into account in the drafting of S. 2. Consequently, we are now commenting on only two aspects of the bill which pose difficulties.

There is no explicit statement in the bill that the Secretary of the Interior is to approve plans for and review research being conducted under title I to assure its adequacy and conformance with the broad objectives of the bill. Section 101 contemplates that the Secretary is to be concerned with fiscal controls to assure that funds are not misapplied. Section 104 provides that the Secretary is to prescribe rules and regulations to carry out provisions of the bill and is to furnish assistance to research institutions. Because these actions do not provide adequate authority to the Secretary of the Interior in administering the program, we believe he should be authorized to set standards for research and to monitor adherence thereto. To that end, we would suggest that language such as the following be inserted at the end of section 100 of the bill: "The Secretary

shall approve proposals for and maintain a review of all research under this section to assure high standards of quality." In the interests of promoting strong research programs we would expect the Secretary of the Interior to encourage cooperative arrangements among State water research agencies, as envisioned under section 102, whenever appropriate. We recommend specific language to this effect be included in the bill.

Finally, we believe that provisions of title III with respect to establishment of a Water Resources Service within the Department of the Interior are unnecessary and undesirable. The Secretary of the Interior now has adequate reorganization authority to take future action if and when he so decides. Furthermore, in view of the general authorization provided in the Postal Service and Federal Employees Salary Act of 1962, special personnel provisions should not be required to staff new constituents of the Department.

Strengthening of university water research activities would constitute a major step toward meeting goals set forth by the President in the water resources area. The Bureau of the Budget advises that enactment of legislation along these lines would be in accord with the President's program.

Sincerely yours,

(Signed) Phillip S. Hughes,
PHILLIP S. HUGHES,
Assistant Director for Legislative Reference.

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE,
Washington, February 18, 1963.

HON. CLINTON P. ANDERSON,
*Chairman, Committee on Interior and Insular Affairs,
U.S. Senate, Washington, D.C.*

DEAR MR. CHAIRMAN: This letter is in response to your request of January 24, 1963, for a report on S. 2, the proposed "Water Resources Research Act."

We are wholly in sympathy with the bill's basic objective to promote a more adequate national program of water research. However, for the reasons summarized below, we question the need for title I of the bill, and we are not wholly in accord with the provisions of title III.

The provisions of title II of the bill—authorizing appropriations to the Department of the Interior to be used for grants, contracts, or matching or other arrangements for conducting research into aspects of water problems related to its mission (not defined in the bill)—are desirable and in accord with existing accepted methods for productive Federal research participation. They provide for the widest possible participation by scientists in research on water resources matters, permit all institutions, public and private, and all disciplines to participate, and can be administered to supply stable support for programs in universities and yet obtain flexibility in research approach. And they would give to the Secretary of the Interior research and research-support authority comparable to that which is vested in this Department under the Water Pollution Control Act in order to promote good-quality water adequate for all legitimate uses.

If title II is enacted and similar authorization is provided, as it should be, for all other Federal water resources agencies that now lack such authority, there is, in our opinion, little, if any, need for the proposed title I programs under which grants would be made by the Secretary of the Interior for the establishment and support of a water resources institute or center at a land-grant college or other State-designated educational institution in each State (including Puerto Rico). However, if title I is retained, some modifications are indicated. In the first place, the complete spectrum of water resources aspects specified as subjects for desirable research and investigations to be conducted by the proposed water research agencies is necessarily of basic interest to all Federal water resources agencies. We would therefore suggest participation by other Federal departments in the formulation of the rules and regulations necessary to carry out these provisions, with the Secretary of the Interior promulgating them. Secondly, we recommend deletion of the provision of section 104 that would require the Secretary of the Interior to encourage and assist in the establishment and maintenance of cooperation between the State research agencies and Federal establishments. We have encountered no difficulties in this regard in the administration of our research programs and,

from the standpoint of this Department, do not perceive any need for an intermediary agent as proposed.

Finally, if the provision for a central water research and investigations catalog is retained in the bill (instead of leaving this matter to administrative discretion), we recommend that the function of establishing and maintaining such a coordinating device, on the basis of reports from Federal and other agencies and organizations, be vested in the Office of Science and Technology—which already has responsibilities for review and coordination of major Federal activities in scientific research—instead of deferring its transfer, as provided in the bill, to the time when, if ever, a central catalog is established for all scientific research.

If the bill is modified as above suggested, we would have no objection to its enactment.

The Bureau of the Budget advises that, while there is no objection to the submission of this report, the enactment of legislation along the lines of S. 2 would be in accord with the program of the President.

Sincerely,

ANTHONY J. CELEBREZZE, *Secretary.*

DEPARTMENT OF THE ARMY,
Washington, D.C.

HON. CLINTON P. ANDERSON,
Chairman, Committee on Interior and Insular Affairs,
U.S. Senate.

DEAR MR. CHAIRMAN: Reference is made to your request to the Secretary of Defense for views of the Department of Defense with respect to S. 2, 88th Congress, a bill "to establish water resources research centers at land-grant colleges and State universities, to stimulate water research at other colleges, universities and centers of competence, and to promote a more adequate national program of water research." The Department of the Army has been assigned responsibility for expressing the views of the Department of Defense on this bill.

Title I of the bill would authorize appropriation of \$75,000 annually, increasing to \$100,000 in the third year, to each of the States to help finance a collegewide or universitywide water resources research institute or center. There would be authorized appropriation of an additional \$1 million, increasing to \$5 million in the fifth year, which the Secretary of the Interior would be authorized to use to match State or other non-Federal funds for specific water research projects at these institutes or centers.

Title II of the bill would authorize to be appropriated to the Secretary of the Interior \$5 million, increasing to \$10 million in the fifth year and annually thereafter, from which he would make grants or enter into contracts or make matching or other arrangements with educational institutions, private entities, or governmental agencies for research into water problems related to the Interior Department mission.

Title III would authorize the Secretary of the Interior to establish in the Department of the Interior a water resources service for the purpose of administering programs authorized in the bill. Section 301 states that nothing in the bill is intended nor shall be construed as giving the Secretary of the Interior any authority or surveillance over water resources research conducted by any other agency of the Federal Government.

The Department of the Army believes that an expansion of State research in the water field, supplementing and complementing the water research of the Federal agencies, would be desirable. Moreover, it is believed that an increase in the grants which the Federal Government now makes to the States to encourage research would be justified by the benefits which would accrue to the Nation as a whole. Hence, the basic objective of S. 2 has the full support of the Department of the Army, on behalf of the Department of Defense.

The attention of the committee is invited to the fact that the National Science Foundation has broad authority for making grants for basic research. In addition, as you are aware, the Office of Experiment Stations in the Department of Agriculture already has organizational facilities through which Federal grants-in-aid of research are being made annually to land-grant institutions. Other important grants to the States for water research are made by the Public Health Service in the Department of Health, Education, and Welfare. In view of the

existence of such agencies, we question the need for establishment of still another agency to administer such programs. Accordingly, the Department believes that they could most appropriately be administered by the National Science Foundation.

The attention of the committee is invited to the fact that the Federal Council for Science and Technology's Task Group on Water Resources Research, on which all of the water resources agencies were represented, has made a careful study of the need for legislation to strengthen the field of water resources research through providing authority for multidisciplinary program grants, extramural research grants, and education and training. Prior to completing its consideration of this bill, it is suggested that the committee should have the benefit of the report of the task group. This Department understands that the report will include a recommendation that a water resources committee be established under the Federal Council for Science and Technology; that committee would be assigned the responsibility for coordinating the planning and programming of Federal in-house and extramural programs of water resources research.

This report has been coordinated within the Department of Defense in accordance with procedures prescribed by the Secretary of Defense.

The Bureau of the Budget advises that the enactment of legislation along the lines of S. 2 would be in accord with the program of the President.

Sincerely yours.

(Signed) CYRUS R. VANCE,
Secretary of the Army.

DEPARTMENT OF AGRICULTURE,
Washington, D.C., February 19, 1963.

HON. CLINTON P. ANDERSON,
Chairman, Committee on Interior and Insular Affairs,
U.S. Senate.

DEAR MR. CHAIRMAN: Thank you for your letter of January 24, 1963, giving us the opportunity to report on Senate bill 2. The bill is entitled "To establish water resources research centers at land-grant colleges and State universities, to stimulate water research at other colleges, universities, and centers of competence, and to promote a more adequate national program of water research."

We support the purposes of S. 2, as it would stimulate water resources research in colleges and universities, thereby strengthening the overall research in this significant field and at the same time helping train new scientists and engineers that are much needed for research and teaching in this field.

Title I of S. 2 authorizes an appropriation of \$75,000, increasing to \$100,000 in the third year, to each of the States to help finance a collegewide or university-wide water resources research institute, center, or equivalent agency. It further authorizes an appropriation of an additional \$1 million, increasing to \$5 million in the fifth year, which the Secretary of the Interior may use to match State or other non-Federal source funds for specific water resource projects.

Title II of S. 2 authorizes an appropriation of \$5 million, increasing to \$10 million in the fifth year, which the Secretary of the Interior may use for grants, contracts, matching or other arrangements with educational institutions, private foundations, or other institutions; private firms and individuals; local, State, and Federal Government agencies to undertake research into any aspects of water problems related to the mission of the Department of the Interior which may be deemed desirable and would not otherwise be studied.

Title III contains certain miscellaneous provisions related to the administration of programs under the bill.

The magnitude of public and private programs to make efficient and effective use of the Nation's soil and water resources is well known.

The U.S. Senate, through its exhaustive "Report of the Select Committee on National Water Resources," has made the public increasingly aware of the Nation's water problems—problems which make it incumbent upon the research agencies to make new advancements in their solutions.

The Department of Agriculture is concerned that the proposed bill covers only a part of the total coordinated program of scientific research on water as requested by the Senate Select Committee on National Water Resources.

The Department of Agriculture has outlined a comprehensive program of basic and applied research on the production, development, management, and use of water on crop, forest, and rangeland watersheds. In its proposed program the Department would direct its studies toward obtaining a better understand-

ing of the basic relationships between the quantity, quality, and management of water and the development and use of other resources of crop, forest, and rangelands. Research is now and in the future would be aimed at economic and institutional problems of water use, improving water yields from our forested watersheds and rangelands, increasing efficiency in the agricultural use of water, and protection of our soil resources from uncontrolled water. Such a program would be substantially as outlined in committee print No. 28, Senate Select Committee on National Water Resources entitled "Water Resources Research Needs."

Agriculture's tremendous responsibility in the effective use of water is evident when we consider some of the data on water use and management. The average annual precipitation for the conterminous United States is 4.75 billion acre-feet. The first impact of this primary water supply is on the surface of the land. The nature of vegetative cover, slope, soil characteristics, cropping patterns, and conservation practices exert the first determination whether precipitation becomes surface runoff, deep percolation, or soil moisture for evapotranspiration. The lion's share of this total water supply—3.38 billion acre-feet—presently is used by evapotranspiration from vegetative lands. The remaining 1.37 billion acre-feet constitute the massed water supply available to the Nation. Irrigation agriculture is dependent on this supply and accounts for 90 percent of the water that is consumptively used.

How land in farms and forest, and rangeland not in farms, are managed has a tremendous impact on the potential yield and use of water. In fact, water, soil, and vegetation are so closely related that they cannot be managed separately. Thus, it has been logical and necessary for the U.S. Department of Agriculture to develop programs of soil and water research and watershed management over the past 50 or 60 years. The close association in the U.S. Department of Agriculture between research and action in land and water use is of great importance. Each serves the other. Action programs in the U.S. Department of Agriculture dealing with more than three-fourths of the land area in the United States are principal users and often the first to use research results. They provide practical tests for research and point the way to new investigations. Also, research is often directed to specific management problems.

This partnership of research and management in the U.S. Department of Agriculture has produced an understanding of the close association of soil, water, and vegetation resources. The long background of experience and interest has established in the Department a capability acquired through a long tradition of scientific research. This has enabled it to make the major contribution to progress in the entire field of soil and water conservation research. The Department of Agriculture's long history of effective cooperative and coordinated work with the program of the land-grant colleges as established under the Morrill Act of 1862, including cooperative work carried out under the Hatch Act of 1887, further establishes its position of leadership in conducting the type of effort proposed in title I of the bill. The proposed administrative arrangements in title I would unavoidably complicate this relationship and generate new problems of research coordination at the State level.

We construe the language of section 100(a) to render eligible the State agricultural experiment stations as qualified for designation, at the option of the land-grant college, as a water resources research institute, center, or equivalent agency.

Title II of the bill we wholeheartedly support, but recommend that it be broadened to include the Secretary of Agriculture and the mission of the Department of Agriculture so that the established technical competence in each of the Departments will strengthen the total needed effort in water resources research. The Department of Agriculture currently has very limited authority for research grants other than the Hatch Act as amended.

This Department is seriously concerned about some of the provisions contained in title III of the bill. We question whether it is the most effective form of organization to authorize one of the departments participating in water research to exercise a coordinating role in relation to the activities of other departments. We suggest that this coordinating role might more properly be exercised by the Executive Office of the President. These comments apply particularly to section 300.

The Bureau of the Budget advises that enactment of legislation along the lines of S. 2 would be in accord with the program of the President.

Sincerely yours,

ORVILLE L. FREEMAN, *Secretary.*

THE SECRETARY OF COMMERCE,
Washington, D.C., February 19, 1963.

HON. CLINTON P. ANDERSON,
*Chairman, Committee on Interior and Insular Affairs,
U.S. Senate, Washington, D.C.*

DEAR MR. CHAIRMAN: This letter is in reply to your request for the views of this Department with respect to S. 2, a bill to establish water resources research centers at land-grant colleges, and State universities, to stimulate water research at other colleges, universities, and centers of competence, and to promote a more adequate national program of water research.

The bill would authorize grants of \$75,000 annually (to be increased eventually to \$100,000 annually) to land-grant or other institutions designated in each State for the financing of water-research institutes therein. The bill would also authorize appropriations of \$1 million for fiscal year 1964, and greater amounts in succeeding years for grants to be matched by the States and used to finance water resources research projects at such institutes. Finally, the bill would authorize appropriations of \$5 million for fiscal year 1964, which would increase annually by \$1 million for 5 years to be used for any aspects of water research related to the mission of the Department of the Interior.

The Department of Commerce believes that increased emphasis should be placed on water resources and related research, and we are, therefore, in favor of the objectives of S. 2.

We feel that the establishment of 50 or more separate research institutes might result in duplication of effort and consequently in some inefficiency. Although there may be a need for a geographically dispersed program in some research fields such as agriculture, the needs of water resources research programs are quite different. Therefore, the same degree of dispersal for water research is not necessarily justified by the satisfactory experience under agricultural research programs. This objection might be met by establishing only a limited number of water-research institutes by States cooperatively on a regional basis.

The Bureau of the Budget advises that enactment of legislation along the lines of S. 2 would be in accord with the program of the President.

Sincerely yours,

C. D. MARTIN, Jr.
Acting Secretary of Commerce.

Senator ANDERSON. I introduced a first draft of this water research bill last July for the purpose of having it studied, getting reports and preparing a revised version.

There were many very constructive and helpful suggestions made to us. Most of them were incorporated in the bill and it was reintroduced on January 14 and became S. 2 of the 88th Congress, which is before us today.

We have a distinguished list of witnesses, including a panel of five outstanding State University educators and equally distinguished scholars and experts in the water research field from other institutions of higher education and private life. There are also our faithful following of organizational representatives, whom we see rather regularly. They render this committee a real service the year around by bringing the viewpoints, the ideas and the positions of their constituencies on many matters. They are always welcome and appreciated.

Since some of you will leave before the close of the hearings, I want to thank all witnesses now for their part in this hearing. I believe we are dealing with a measure that can make a significant contribution to the continued growth and well-being of our country. I deeply appreciate, and I am sure other committee members join me, the time that each of you has taken to study S. 2, to prepare comments, and to assist in its consideration.

Senator ANDERSON. Senator Bible, did you want to comment on the bill?

Senator BIBLE. Mr. Chairman, I would like to endorse this bill and congratulate you on formulating it and sponsoring it.

We have the desert research center at the University of Nevada. As the committee print on water research projects shows, it is doing research work on reduction of evaporation, increasing streamflow and forage production through the eradication of undesirable plants, water quality, weather modification, underground water, drainage, integrated ground and surface water management, and other problems of an arid area.

Unfortunately, we do not even have a supply of saline or brackish water to offer us hope in the Great Basin, except in the Salt Lake area, and we don't want to empty the lake. Success of the saline water work, which I heartily support, will not improve our situation much, if any at all.

Our great hope for water to sustain growth and economic development lies in careful management of every drop we have, and in weather modification—more rain and snowfall. That appears to be several years away.

In looking over the projects of the University of Nevada, I am impressed that the university officials are having to more or less stitch together a program, project by project, as they go along. They use Hatch agricultural research funds, National Science Foundation grants and in one instance they have two State agencies and six Federal agencies cooperating in a project.

It seems to me that the section 100(a) funds provided in the bill—a regular, basic allowance for the maintenance of a water resources research institute or center—provide a very important assurance of a continuing, minimum program, which will make it possible for the university to attract more of its faculty people to work on water problems. There will no longer be the threat that the program will phase out as projects are completed. I am sure that both the 100(a) and 100(b) funds will make possible research which will pay manifold dividends, not just to Nevada, but the Nation. What we learn about phreatophytes and other useless plants, or weather modification, or conservation of water by improved irrigation practices, will be of use in other States, and in other nations around the world.

We are eyeball-to-eyeball with water shortage in Nevada. It is not difficult for us to see not just the practicality, but the urgency, of the program Senator Anderson has proposed. Perhaps some of the humid States will not have such a feeling of urgency for another decade, or even two or three decades. But I suggest that it will be their good fortune that this program was started well before they are hard pressed by their water problems, as we are in Nevada.

I am impressed that the provisions of the bill agree, almost item by item, with the needs and recommendations subsequently made by the Water Resources Task Group of the Federal Council for Science and Technology. It provides for the development of additional centers of water research, for aid on both the continuing and project basis recommended by the Council, for local autonomy and for unified Federal administration.

This program will both get needed research done and train the increasing number of experts we need in the water field in the years just ahead.

Thank you, Mr. Chairman, for the opportunity to make this statement. This is a fine bill which we should enact without delay.

Senator ANDERSON. Thank you, Senator Bible.

Since I mentioned the new Member from Arizona and expressed my joy in seeing him here, I see Senator McGovern of South Dakota is also here for the first time. George, we welcome you and are very happy to have you take your place on this Committee.

Senator MCGOVERN. Thank you very much.

Senator ANDERSON. The Committee has letters and statements on S. 2 from Senators Hart, Morse, Engle, and Fong—all supporting the bill—which will go in the record at this point.

(The statements referred to follow :)

U.S. SENATE,
Washington, D.C., February 19, 1963.

HON. CLINTON P. ANDERSON,
Interior and Insular Affairs Committee,
U.S. Senate, Washington, D.C.

DEAR SENATOR: S. 2, which I was privileged to cosponsor with you will, I believe, be a very important milestone in the Nation's effort to tackle the water problem.

We in Michigan used to think that this was something for the West to worry about, that we had an inexhaustible supply of fresh water. We are learning, better every day, that this is not so.

In this respect, the work of the Senate Select Committee on National Water Resources served us well. I remember particularly the hearing in Detroit, where Dean Fontanna told us: "One of the remarkable things about the Great Lakes is the tremendous lack of knowledge of the waters of the Great Lakes. It is a matter of fact that the amount of research into the various aspects of the waters of the Great Lakes has been very, very minimal. It has been attacked spasmodically by State agencies, and by Federal agencies and by the Canadian Government, but only spasmodically and on a very, very small scale."

Certainly I share your conviction, embodied in S. 2, that our State resources for research must be fully and effectively utilized. I am proud that Michigan State University has already established a water resource institute, and that the University of Michigan's competence has received additional national recognition with the location of the new Public Health Service Water Pollution Laboratory at Ann Arbor. Others of our institutions are also contributing to our knowledge and ability in this field.

This program will be welcome in Michigan, and I wish to add my word of support for early passage of the legislation.

Sincerely,

PHILIP A. HART.

U.S. SENATE,
COMMITTEE ON FOREIGN RELATIONS,
February 18, 1963.

HON. CLINTON P. ANDERSON
United States Senate, Washington, D.C.

DEAR CLINT: I note that on February 19 and 20 your subcommittee will be hearing witnesses on S. 2.

This is a measure which has my full support. It is my hope that the subcommittee, the full committee and the Senate will take early and favorable action upon it.

With best personal regards.

Sincerely,

WAYNE MORSE.

U.S. SENATE,
COMMITTEE ON COMMERCE,
February 25, 1963.

HON. HENRY M. JACKSON,
Chairman, Senate Interior and Insular Affairs Committee,
U.S. Senate, Washington, D.C.

DEAR MR. CHAIRMAN: I should like to endorse the testimony in support of S. 2 that was presented by Dr. Daniel G. Aldrich and Dr. Omer J. Kelley, of California, at the committee hearings on February 18 and 19. Thank you for your consideration of their interest in water research work.

As a cosponsor of S. 2, I am pleased to note the favorable reports on it submitted by the Department of the Interior, the Budget Bureau, the Federal Power Commission, and the President's Office of Science and Technology.

With kindest regards,
Sincerely yours,

CLAIR ENGLE, *U.S. Senator.*

STATEMENT OF HON. HIRAM L. FONG, A U.S. SENATOR FROM THE STATE OF HAWAII

I appreciate this opportunity to submit this statement in support of S. 2, the water resources research bill. As a cosponsor of the measure, I heartily endorse the objectives of the bill and the approach proposed for dealing with this all-important subject of research into water resources.

There is every reason to be concerned over the growing problem of water shortages in the United States. The enormous increase in population, the rising per capita consumption of water, the increasing pollution, the shortage of transmission and distribution facilities—all contribute to a major problem for our Nation.

S. 2 is designed to establish water resources research centers at land-grant colleges and State universities, to stimulate water research at other colleges, universities, and centers of competence, and to promote a more adequate national program of water research. By these means, I believe we can go far toward achieving the objective of assuring the Nation at all times an abundance of water, both as to quantities and quality.

Speaking for the people of the State of Hawaii, I wish to express the great importance we place upon water research in coping with our present problems and the future growth of our island economy.

We, too, have had our problems of water shortages. While we share the general problem with some other sections of the country, the causes of our trouble are unique. It will require local research to overcome them.

In 1959 the Senate Select Committee on National Water Resources, chaired by the late Senator Robert S. Kerr, agreed that separate and specific attention should be given to the water problems of Hawaii and Alaska because in many respects the water problems of the two newest States are far different from those of the contiguous States of the United States. Moreover, the committee noted that the two States have not had the benefit of longstanding water resources programs which have been carried out in the older States.

At the committee's request, the Secretary of the Interior prepared and submitted a report covering the water resources of Hawaii. The Department's report pointed out that the Hawaiian Islands receive an abundant rainfall but that because of mountainous terrain precipitation is distributed unequally and because of seasonal variations in precipitation there are several areas with recurring water shortages.

However, the report pointed out that the water problems of the islands can be solved if the economic problems relating to the development of the water resources can be solved, as the water resources are there and can be made available if we are willing to pay the relatively high costs involved.

The Department of the Interior identified the major water problem in all of the islands of Hawaii as one of adequate supply for expansion of man's activities. "As the population of the islands is increasing rapidly—it more than doubled between 1930 and 1959—the demand for water is also increasing rapidly," the Department's report noted. "Much of the increase in demand on Oahu arises from the greater per capita demands as well as the greater number of people.

There are sizable tracts of land on each of the islands that could be agriculturally productive if adequate water could be found for them. Many problems arise because of the lack of complete knowledge about ground water."

The report then described the problems facing each of the islands, pointing out the areas of water shortages. In recent years we in the State of Hawaii have become acutely conscious of the water shortages that have developed in certain locations, requiring the costly hauling of water by trucks (and even by ship tankers from another island) in order to provide water for domestic uses as well as for agricultural and commercial purposes.

During the latter part of 1962 and into this year, drought problems in some sections became so prolonged and acute that they were declared disaster areas and emergency assistance by way of surplus grains had to be provided by the Federal Government to prevent cattle herds from being wiped out.

Some research needs in water conservation in Hawaii have been identified by such agencies as the Soil Conservation Service of the U.S. Department of Agriculture. A considerable volume of printed materials on water supply and use in Hawaii has been compiled over the years. Although appreciable information exists there are some serious gaps. Research can give some answers in minimum time for a number of problems. Long-range research also would be in order so that more detailed information can be obtained and analyzed. It is evident that a great deal more research in many phases of water resources is needed in Hawaii.

In response to the request last year of Senator Clinton Anderson, then chairman of this committee and now the prime sponsor of S. 2, the University of Hawaii furnished data on its research projects, underway or scheduled, that bear on the possibilities of increasing usable water supplies or making more efficient use of present supplies.

The University of Hawaii, as a land-grant university, wholeheartedly endorses the objectives of S. 2. Dr. Thomas Hamilton, the president of the University of Hawaii, states that the economic growth of Hawaii requires continual modification and expansion of water development. The problems of locating, analyzing, and conserving water supplies arise continually. According to Dr. Hamilton, water research needs are pressing and Hawaii's unique problems make local research essential. I am including the full text of a wire I received February 20 from Dr. Hamilton on this subject.

Both the short- and long-range needs of the State of Hawaii require the expansion of water resources research of the kind envisioned in S. 2. The future growth of Hawaii—her increasing population, expansion of agriculture, and the need for more jobs and income—is dependent to a large extent on our ability to develop, conserve, and utilize our water resources. We need the best research in order to accomplish these goals.

I urge that the members of this committee approve S. 2. The people of Hawaii will be grateful to you for your approval of this important measure.

HONOLULU, February 19, 1963.

Senator **HIRAM FONG**,
U.S. Senator From Hawaii,
Washington, D.C.:

Economic growth of Hawaii requires continual modification and expansion of water development problems of locating, analyzing, and conserving water supplies arise continually. Water research needs are pressing. Unique problems make local research essential.

THOMAS HAMILTON,
University of Hawaii.

Senator **ANDERSON**. The first witness this morning is the Secretary of the Interior, Stewart Udall, accompanied by an able aid well known to the committee since he served on the staff for several years, Eugene D. Eaton.

Mr. Secretary, we are very happy to have you here and will be very happy to hear from you.

STATEMENT OF HON. STEWART L. UDALL, SECRETARY OF THE
INTERIOR, ACCOMPANIED BY EUGENE D. EATON

Secretary UDALL. Thank you, Senator. It is a real pleasure to appear before you and I, too, would like to felicitate the committee on the new members you have. Senator Hayden's decision to come on Interior, I think, should be good news for you since he knows all the legislation and appropriations of the last 50 years, and I am sure you will find him a very valuable addition to the committee.

Senator ANDERSON. I can only say, Mr. Secretary, like you, I served in the House of Representatives and on a sort of Interior Committee. Many times things were taken out of our bills on the House floor by the large city delegations that caused distress to all of us. We would get together around the crying towel and cry a little bit, and then we would say, "well, Senator Hayden will put it back in." He almost always did. So we are very glad to have him here this morning.

Secretary UDALL. I think if I may add to that, Mr. Chairman, the Senator has put more things back in for conservation and has done more things to build the country than anyone in the history of the country.

As all of us know, the process of getting things started is two steps, one, the legislative, the matter of declaring legislative policy which is the step we are at now, and the second is the process of getting the money.

I think this is one of the most significant pieces of legislation that I will have an opportunity to testify on this year. The truth of the matter is that since the really fine landmark study of our water problems in this country conducted by the select committee under the chairmanship of the late Senator Robert Kerr, from Oklahoma, was completed about 2 years ago, that, in my opinion at least, we haven't really undertaken the task of fully implementing that report. I think the river basin planning legislation that the President has submitted is one step.

This proposed legislation (S. 2) is another equally significant step. And I am very hopeful, Mr. Chairman, that due to the interest that has been aroused across the whole country by the bill that you have sponsored and by the wonderful opportunity this offers to tackle problems that will always be with us and that are getting more difficult and more grave as we go along, that we can do an adequate job.

An account appeared in the press this morning of a report that was prepared by a committee under Dr. Wiesner—I understand Dr. Wiesner is going to appear—and headed by Dr. Roger Ravelle, my own science adviser. I think this report should be part of the file, part of the record on this hearing, because it shows the growing need all over this country for an understanding and a knowledge of our water problems and because there is no resource more basic for human needs, for industrial use, for all uses than this key resource.

This committee has given distinguished leadership, Mr. Chairman, in many aspects of water resources problems and notably so in providing for the studies of the Select Committee on National Water Resources. As a result of those studies, we have informed under-

standing of the facts of water resources problems and the lines of action that are needed.

The bill being considered by you today is an important step forward in solving water problems. It will implement a key recommendation of the Select Committee on Water Resources.

The grave facts of our water situation are acutely evident. In major areas of the Nation water supply deficiencies threaten economic growth and living conditions. This is a threat right now in much of the West, it is only one or two decades away in some of the Middle Western States, as the report of the scientists pointed out this morning, and for many localities even in the humid areas both water quality and water quantity problems are increasingly serious.

The select committee provided clear recommendations for remedial action. Its factual studies demonstrate that the yearly rainfall that maintains streamflow and lake levels, on the average, is more than enough to meet all requirements for population and economic growth well into the next century.

But those studies show that there are complex and difficult problems of water resource development and conservation, to even out the annual and seasonal variations in runoff, to equate geographic differences in the location of water occurrence and water use, and to choose among competing water uses for municipal, agricultural, and industrial developments. Among the most difficult problems are how to provide for the growing water requirements of recreation and wildlife, how to deal with the water-borne wastes from the chemical, paper, mineral, and other industries and still save the healthful and beautiful waterways with which this Nation is endowed.

One of the principal recommendations of the select committee is to increase water resources research effort. A considerable number of outstanding scientific and engineering authorities have expressed the view—a view which I share—that action to strengthen water resources research is among the most important and productive actions that can be taken at this time.

This is true because the impact of water shortage on economic development, human welfare, and national security can be so drastic, and water requirements are growing greatly and expanding in relation to the fixed amount of the water supply. For this reason we must rapidly increase our knowledge of how to conserve water resources and increase our ability to use them fully and wisely. This bill, S. 2, the proposed Water Resources Research Act, is a major advance toward that objective. And I should like to say a very creative step toward that objective.

This administration vigorously supports the water research work of the Federal agencies. Eight major Federal agencies are engaged in this; and their staffs include some of the most highly competent scientists and engineers in their professions. In 1963 funds for water resources research are 40 percent more than the preceding year, and this shows that members of the Appropriations Committee, for example, are deeply conscious of this problem. The President's budget for fiscal year 1964 provides a further increase.

In my own Department of the Interior, water research is carried on by the Office of Saline Water, the Geological Survey, the most pioneering organization in the field, the Bureau of Mines, the Fish and Wild-

life Service, the Bureau of Reclamation, and others as well. Our program has grown from a 1962 level of \$17.5 million—this is research money—to \$35 million requested in the 1964 budget.

But encouraging as is the research progress of the Federal agencies, it alone cannot be expected to meet our needs in time. We need to expand water research so as to be able to match water uses with the supply available, and the timetable makes this urgent. By 1980 water supply will limit further growth and development in major portions of the Nation.

Let me remind you that expenditures on water facilities in the United States are now more than \$10 billion per year, but we know that this will have to be multiplied very substantially to meet rising water requirements. In the multibillion dollar water expenditures, research is only three-fourths of 1 percent of the total.

No progressive industry or country can remain healthy with such inadequate attention to research. The Federal Government, the States, and local governments need vigorous research programs to maintain the efficiency of their operations in the water resources field. Doubling or tripling of water research is certainly necessary.

Now, how should we go about doing this?

For one thing, research by Federal agencies must be greatly strengthened because it is the principal source of competence in water problems that are national in scope. Additionally, a great number of recognized experts in the water field advise that there are other urgent needs for enlarged and expanded water research. But they also point out that the shortage of competent research scientists and engineers now is a major limitation on our ability to get the knowledge needed.

A clear-cut answer to this is to enlist the research resources of the universities. They are an important reservoir of technical competence that has been only partially utilized.

If I may say, Mr. Chairman, one of the things that has impressed me most as a new administrator of the past 2 years, one of the things I hadn't realized previously, is the extent to which the success of our country in conservation, in the use of our resources, in the field of energy, and the military field, too, really rest on our success in scientific research of all kinds.

Senator ANDERSON. Mr. Secretary, since you sort of interrupted yourself in your address there, do you mind if I ask you if sometime you would give us a comment on whether you think three-fourths of 1 percent is a fair amount to put into research? Or do you deal with that later on in your statement?

Secretary UDALL. Well, the point I would make is that if you take any industrial concern—I don't care whether it is in the field of minerals, field of manufacturing, processing, whatever it is—that the amount spent for basic research will normally run anywhere from 3 to 5 to 6 percent or more. And so this amount actually is very low, dangerously low.

Senator ANDERSON. It is extremely low.

Secretary UDALL. That is correct.

Senator ANDERSON. I know we set up a Research Administration one time in the Department of Agriculture, set up a Research Act, made a study of what all the progressive industrial companies were doing, and we found that a great many of them were spending many,

many times in excess of what you mention here. I wouldn't want the impression to go out that you thought three-fourths of 1 percent was a large figure.

Secretary UDALL. No.

Senator ANDERSON. You think it is a small figure?

Secretary UDALL. It is a very small figure. One of the great success stories of this country, and this is, in fact, so successful that we are overproducing, is in the field of agriculture. This is known all over the world: that American agriculture is one of the wonders of the world. But this, in my opinion—and I am not an agricultural expert, but my scientists tell me that this is the case—if you are going to single out any one factor for our success in this field, it is research, the fact that we have had this agricultural extension program, the research stations and the universities. And this is what the chairman has really proposed in this bill and what the administration supports—to use this pattern of activity that has been so successful in the field of basic agricultural research and take it over into the water field.

The bill to accomplish this implements the recommendations of the Select Committee on National Water Resources, the report of the National Academy of Sciences-National Research Council, the findings of the Federal Council on Science and Technology and many distinguished scientists and engineers including the President's Science Adviser, Dr. Jerome B. Wiesner. Its principles are endorsed by the Association of State Universities & Land-Grant Colleges, by a number of professional societies, and by associations in the reclamation and soil and water conservation fields.

Legislation to assist water resources research at universities will have two beneficial results. It will enlist the scientific and engineering competence of university research in water resources problem solving, and it will also result in augmenting the critically inadequate numbers of scientists and engineers trained in the sciences related to water resources.

The proposed legislation would build on and utilize the established facilities of the State colleges and universities, thereby taking advantage of a system of educational institutions that for over a century has demonstrated its effectiveness in advancing and disseminating knowledge widely throughout the Nation. Concurrently, the proposed legislation would enable State universities to strengthen their participation in the sciences of natural resources management. These are persuasive reasons for establishment of broadly based water resources research centers at State universities.

The universities' readiness to accept the obligations and opportunities of participation in water research activities has been stated by the Association of State Universities & Land-Grant Colleges.

I see, Mr. Chairman, that you have a distinguished list of witnesses representing that organization.

Because a number of university representatives are scheduled to testify, I defer to them as spokesmen for the academic world. I want to say, however, that from the point of view of the Department of the Interior, we greatly welcome and look forward to full involvement of universities in this critically important field of water resources research.

Another special benefit that will result from water resources research centers at State universities will be their increased ability to provide informed professional assistance to State and local officials and others concerned in State, local, and regional water-resources problems.

As water resources activities move ahead, State and local governments and nongovernmental interests will take an increasingly active part in them. That participation needs expert professional assistance that is informed on local conditions and local problems. The water resources research centers at the State universities can provide that needed professional assistance.

It is our opinion, if I may say so, Mr. Chairman, that there is no region, there is no State that does not have its own peculiar problems, and we think this type of research center activity will prove, just as the agriculture research program has proved, a very wise step.

The bill being considered by the committee, S. 2, provides that, in addition to the land-grant colleges and State universities, other universities and research institutions may also be aided in water resources research. In other words, the total program is not limited merely to the land-grant schools.

Title II of the bill makes it possible to enlist research competence wherever it exists—at any university or college, and also at nonacademic research institutions.

These provisions will encourage and strengthen competence at a number of locations throughout the United States. High caliber professional activity in water resource matters should exist widely throughout the United States so that it is readily accessible to people everywhere as they may need it.

The bill recognizes that in order to avoid unproductive duplication of research, assistance to universities will have to take account of the investigations being carried on or programed by the various Federal and non-Federal agencies.

Provision for this is made in section 300. The information on research activities thus assembled will, of course, be extremely useful to many people in the water resource field. For that reason, the bill wisely provides that such information shall be available for general use.

In this connection, I want to mention the overall coordination of research in the executive branch. Recognizing that Federal research has now grown to the \$15 billion per year level, overall, President Kennedy established the Office of Science and Technology to give the needed scientific leadership.

The Department of the Interior looks to the Director of Science and Technology as the representative of the President for overall coordination of water resources research and we believe that information developed by the Interior Department will be useful to him in that capacity.

I am fully in accord with the provisions of section 301 that clarify Interior Department relationships in water resources research. This section makes abundantly clear that the purpose of the legislation is to increase the amount of water resources research and not in any degree to take over or to curtail the activities of any agency, Federal or non-

Federal. My principal comment is that so much water research is urgently needed that there is much more than enough for everyone to do.

Now, just a word or two on our preliminary views on the mechanics of the program. First, it seems to me important to bear in mind that the purpose of the program is to enlist the research abilities of the universities to broaden national competence in water resources research.

In order to tap the abilities and to enlist the interest of the university people, they should have a lot of initiative in proposing what research projects they undertake.

Such projects would be sent forward by the universities as proposals for Federal assistance. Of course, in many cases, research proposals will come about because State or local officials or others request the university people for information or advice which will show that there is need for research on the subject.

Through the continuing leadership of the President's Office of Science and Technology, there would be interdepartmental coordination so as to avoid duplication or other unproductive expenditures of money or technical manpower.

As a basis for decision on whether to award a grant or contract, I expect to rely to a considerable extent on consultants who should be the best men in each of the scientific and engineering fields involved. These technical experts would be qualified to advise on the technical merit of research proposals.

Furthermore, the program would need to be considered both as to its overall technical adequacy and also as to the broad public interest. For this purpose there would be need for advice that would evaluate and recommend on the overall progress and direction of the program. It seems to me that this kind of consultation is essential for the Secretary of the Interior, and in addition, I believe that it should be helpful to the universities as well.

This is in accord with section 104 of the bill under which the Secretary of the Interior would have responsibilities to advise with the universities relative to their water research activities. I am confident that this function can be mutually beneficial both to the universities and to the Government, and that it will establish a helpful relationship.

Naturally, there is concern about what is done with Federal funds that may be granted to non-Federal organizations. I feel that this bill, S. 2, provides for fiscal responsibility and accountability so that reasonably simple procedures will give the needed protection in this regard.

As a final word, Mr. Chairman, permit me to commend you and this committee for the important service you are performing to the whole field of water resources. This bill, the proposed Water Resources Research Act, is in my opinion a bold step forward.

Thank you for the opportunity to present my views. I am very happy to be with you this morning.

Senator ANDERSON. Thank you, Mr. Secretary. At this point, without objection the full written text of your statement will appear in the printed record of this hearing.

(The statement is as follows:)

STATEMENT OF STEWART L. UDALL, SECRETARY OF THE INTERIOR

Mr. Chairman, planning, foresight, and research are the essence of sound action where our water resources are concerned.

This committee has given distinguished leadership in many aspects of water resources problems and notably so in providing for the studies of the Select Committee on National Water Resources. As a result of those studies, we have an informed understanding of the facts about water resources problems and the lines of action that are needed.

The bill being considered by you today is an important step forward in solving water problems. It will implement a key recommendation of the Select Committee on National Water Resources.

The grave facts of our water situation are acutely evident. In major areas of the Nation water supply deficiencies threaten economic growth and living conditions. This is a threat right now in much of the West, it is only one or two decades away in some of the Middle Western States, and for many localities even in the humid areas both water quality and water quantity problems are increasingly serious.

The select committee provided clear recommendations for remedial action. Its factual studies demonstrate that the yearly rainfall that maintains stream-flow and lake levels, on the average, is more than enough to meet all requirements for population and economic growth well into the next century.

But those studies show that there are complex and difficult problems of water resource development and conservation to even out the annual and seasonal variations in runoff, to equate geographic differences in the location of water occurrence and water use, and to choose among competing water uses for municipal, agricultural, and industrial developments. Among the most difficult problems are how to provide for the growing water requirements of recreation and wildlife, how to deal with the waterborne wastes from the chemical, paper, mineral, and other industries and still save the healthful and beautiful waterways with which this Nation is endowed.

A SELECT COMMITTEE RECOMMENDATION

One of the principal recommendations of the select committee is to increase water resources research effort. A considerable number of outstanding scientific and engineering authorities have expressed the view—a view which I share—that action to strengthen water resources research is among the most important and productive actions that can be taken at this time.

This is true because the impact of water shortage on economic development, human welfare, and national security can be so drastic, and water requirements are growing greatly and rapidly in relation to the fixed amount of the water supply. For this reason we must rapidly increase our knowledge of how to conserve water resources and increase our ability to use them fully and wisely. This bill, S. 2, the proposed Water Resources Research Act, is a major advance toward that objective.

This administration vigorously supports the water research work of the Federal agencies. Eight major Federal agencies are engaged in this, and their staffs include some of the most highly competent scientists and engineers in their professions. In 1963 funds for water resources research are 40 percent more than the preceding year, and the President's budget for fiscal year 1964 provides a further increase.

In my own Department of the Interior water research is carried on by the Office of Saline Water, the Geological Survey, the Bureau of Mines, the Fish and Wildlife Service, the Bureau of Reclamation, and others as well. Our program has grown from a 1962 level of \$17½ to \$35 million requested in the 1964 budget.

But encouraging as is the research progress of the Federal agencies it alone cannot be expected to meet our needs in time. We need to expand water research so as to be able to match water uses with the supply available, and the timetable makes this urgent. By 1980 water supply will limit further growth and development in major portions of the Nation.

WATER PROJECTS RUN \$10 BILLION A YEAR

Let me remind you that expenditures on water facilities in the United States are now more than \$10 billion per year but we know that this will have to be multiplied very substantially to meet rising water requirements. In the mul-

tibillion-dollar water expenditures, research is only three fourths of 1 percent of the total.

No progressive industry can remain healthy with such inadequate attention to research. The Federal Government, the States, and local governments need vigorous research programs to maintain the efficiency of their operations in the water resources field. Doubling or tripling of water research is certainly necessary.

Now, how should we go about doing this?

For one thing, research by Federal agencies must be greatly strengthened because it is the principal source of competence in water problems that are national in scope. Additionally a great number of recognized experts in the water field advise that there are other urgent needs for enlarged and expanded water research. But they also point out that the shortage of competent research scientists and engineers now is a major limitation on our ability to get the knowledge needed.

A clear-cut answer to this is to enlist the research resources of the universities. They are an important reservoir of technical competence that has been only partially utilized.

The bill to accomplish this implements the recommendations of the Select Committee on National Water Resources, the report of the National Academy of Sciences-National Research Council, the findings of the Federal Council on Science and Technology and many distinguished scientists and engineers including the President's science adviser, Dr. Jerome B. Wiesner. Its principles are endorsed by the Association of State Universities and Land-Grant Colleges, by a number of professional societies, and by associations in the reclamation and soil and water conservation fields.

TWO BENEFITS

Legislation to assist water resources research at universities will have two beneficial results. It will enlist the scientific and engineering competence of university research in water resources problem-solving, and it will also result in augmenting the critically inadequate numbers of scientists and engineers trained in the sciences related to water resources.

The proposed legislation would build on and utilize the established facilities of the State colleges and universities, thereby taking advantage of a system of educational institutions that for over a century has demonstrated its effectiveness in advancing and disseminating knowledge widely throughout the Nation. Concurrently, the proposed legislation would enable State universities to strengthen their participation in the sciences of natural resources management. These are persuasive reasons for establishment of broadly based water resources research centers at State universities.

The universities' readiness to accept the obligations and opportunities of participation in water research activities has been stated by the Association of State Universities and Land-Grant Colleges. Because a number of university representatives are scheduled to testify, I defer to them as spokesmen for the academic world. I want to say, however, that from the point of view of the Department of the Interior, we greatly welcome and look forward to full involvement of universities in this critically important field of water resources research.

Another special benefit that will result from water resources research centers at State universities will be their increased ability to provide informed professional assistance to State and local officials and others concerned in State, local, and regional water resources problems.

As water resources activities move ahead, State and local governments and nongovernmental interests will take an increasingly active part in them. That participation needs expert professional assistance that is informed on local conditions and local problems. The water resources research centers at the State universities can provide that needed professional assistance.

CENTER OF COMPETENCE ENLISTED

The bill being considered by the committee (S. 2) provides that, in addition to the land-grant colleges and State universities, other universities and research institutions may also be aided in water resources research. Title II of the bill makes it possible to enlist research competence wherever it exists—at any university or college, and also at nonacademic research institutions.

These provisions will encourage and strengthen competence at a number of locations throughout the United States. High-caliber professional activity in

water resource matters should exist widely throughout the United States so that it is readily accessible to people everywhere as they may need it.

The bill recognizes that in order to avoid unproductive duplication of research, assistance to universities will have to take account of the investigations being carried on or programed by the various Federal and non-Federal agencies. Provision for this is made in section 300. The information on research activities thus assembled will, of course, be extremely useful to many people in the water resources field. For that reason, the bill wisely provides that such information shall be available for general use.

In this connection, I want to mention the overall coordination of research in the executive branch. Recognizing that Federal research has now grown to the \$15-billion-per-year level, President Kennedy established the Office of Science and Technology to give the needed scientific leadership.

The Department of the Interior looks to the Director of the Office of Science and Technology as the representative of the President for overall coordination of water resources research and we believe that information developed by the Interior Department will be useful to him in that capacity.

I am fully in accord with the provisions of section 301 that clarify Interior Department relationships in water resources research. This section makes abundantly clear that the purpose of the legislation is to increase the amount of water resources research and not in any degree to take over or to curtail the activities of any agency, Federal or non-Federal. My principal comment is that so much water research is urgently needed that there is much more than enough for every one to do.

UNIVERSITY RESPONSIBILITY

Now just a word or two on our preliminary views on the mechanics of the program. First, it seems to me important to bear in mind that the purpose of the program is to enlist the research abilities of the universities to broaden national competence in water resources research.

In order to tap the abilities and to enlist the interest of the university people, they should have a lot of initiative in proposing what research projects they undertake. Such projects would be sent forward by the universities as proposals for Federal assistance. Of course, in many cases, research proposals will come about because State or local officials or others request the university people for information or advice which will show that there is need for research on the subject.

Through the continuing leadership of the President's Office of Science and Technology, there would be interdepartmental coordination so as to avoid duplication or other unproductive expenditures of money or technical manpower.

As a basis for decision on whether to award a grant or contract, I expect to rely to a considerable extent on consultants who should be the best men in each of the scientific and engineering fields involved. These technical experts would be qualified to advise on the technical merit of research proposals.

Furthermore, the program would need to be considered both as to its overall technical adequacy and also as to the broad public interest. For this purpose there would be need for advice that would evaluate and recommend on the overall progress and direction of the program. It seems to me that this kind of consultation is essential for the Secretary of the Interior, and in addition I believe that it should be helpful to the universities as well.

This is in accord with section 104 of the bill under which the Secretary of the Interior would have responsibilities to advise with the universities relative to their water research activities. I am confident that this function can be mutually beneficial both to the universities and to the Government, and that it will establish a helpful relationship.

Naturally, there is concern about what is done with Federal funds that may be granted to non-Federal organizations. I feel that this bill (S. 2) provides for fiscal responsibility and accountability so that reasonably simple procedures will give the needed protection in this regard.

As a final word, Mr. Chairman, permit me to commend you and this committee for the important service you are performing to the whole field of water resources. This bill, the proposed Water Resources Research Act, is a great step forward.

Thank you for the opportunity to present my views. If you or others of the committee have questions, I will gladly try to answer them.

Senator ANDERSON. Mr. Secretary, you have a paragraph, three or four paragraphs from the end, where you say the Secretary of the

Interior would have responsibility to advise with the universities relative to their water research activities. When I was Secretary of Agriculture, we tried to set up an agriculture research act, the Department of Agriculture sent questionnaires out to find out what every university in the country was doing in the way of agricultural research and we would find out, for example, that one university right next door to another university was engaged on the same problem. They didn't know they were doing research in the same field.

We had an example of a study on the question of dyeing irrigated cottons and putting colors into rainbelt cotton. Two institutions were making parallel studies and neither knew the other was doing it. By getting a chance to list all the things that the Department is doing everywhere, we found it was possible to increase the efficiency of research work by reducing unnecessary paralleling and duplicating.

Don't you feel this is a further advantage to this bill, that you will get a chance to know what is under way so, if projects are proposed on one subject you can pursue one aspect in one area and a different phase of the same subject somewhere else, but not necessarily the same thing?

Secretary UDALL. I think this is a very good point, Mr. Chairman, that this is one of the advantages that does not now exist. We think that through a relatively simply procedure, this type of coordination, is not only practical, but would be highly useful to everyone concerned.

Senator ANDERSON. Fine.

Before we go further with questions, another newcomer has just come in, Senator Gaylord Nelson, of Wisconsin. We welcome you. Your State under your administration made great strides in conservation. Other States might well follow its example.

I also want to say that you testified before this committee many times and were an excellent witness. We are very happy to have you on the committee.

We will start with questions.

Senator MOSS?

Senator MOSS. I really have no questions, Mr. Chairman. I wish to commend the Secretary for his interest in and leadership in this field. Coming from the arid State of Utah, we know the value of research and we need this sort of impetus to promote research on water, learn how to use it better, and preserve it better and develop it better.

Thank you very much.

Senator ANDERSON. Senator Hayden?

Senator HAYDEN. I have no particular comments to make except I doubt if there is any State in the Union that needs water more than Arizona. We are very rapidly exhausting our underground water supply. A very serious situation is being developed there.

Senator ANDERSON. The State of Arizona is mining its water resources very rapidly. I remarked in a short talk last week in Albuquerque that if Arizona finally won all the things it wants to win in the California-Arizona water suit, it will only be able to offset part of its present deficit, and that is pretty rough.

Secretary UDALL. Mr. Chairman, if I may say so, and there is no point in not speaking one's mind on this subject, it has always been

my regret that Arizona, as far as underground water is concerned, did not follow the New Mexico pattern but decided to mine it, not as a renewable resource, but rather as something which would just be taken out like ore and after it is taken out we are through. And I think a lot of us have had cause to regret that this is what has taken place.

Senator ANDERSON. I think there are many hopeful signs and there may be opportunities to find new ways of developing water supplies. I know that you, Mr. Secretary, will be interested in the possibility of the use of nuclear energies to develop supplies, and of making better use of our water. I know the able chairman of the Appropriations Committee has the same feeling. I do believe we will be able to clear some of these things up. We are very glad that Senator Hayden made the remark he did.

Senator McGOVERN?

Senator McGOVERN. Mr. Chairman, I would just like to raise a couple of points that were brought up in the discussion I had this morning with a man from my State who is very much interested in this bill and who supports the general outline of the bill. I will be interested in the Secretary's comments on the point.

He raised the question first of all about the need for the training of experts in this field. He said that, important as research is, at least in our State the great need is for competent people, and he felt that possibly this might have an even great priority than basic research.

Secretary UDALL. This is a very good point and this is one of the things that I learned from Dr. Wiesner and my own science adviser, that any scientific program can be no better than the people that you have developed. Of course, they come out of the universities, and the competence of the professional people in the universities in turn has a very direct relationship to the number of graduates and students. We think this is one of the real advantages of this legislation, because some of our State universities have very few people at the present time working in this field. This proposed legislation would give those universities an opportunity to set up a research center and to develop competent people and to begin to produce the type of people with the ability and scientific skill that we will need in this field.

So it has this other beneficial effect, too, that you point out.

Senator McGOVERN. The second point he raised about it is the danger that this approach might lead to a certain amount of fragmentation in our water-resource programs. Do you have any comment on that?

Secretary UDALL. Well, I don't consider that is a real hazard. In something like water which is a universal problem, and looking to a national program with each State setting up an institute at its land-grant college, I do not believe that this is fragmentation. Of course, this is something to be concerned about, and this is the reason that we need coordination. But I think the agricultural research programs have proved the wisdom of activating the States, of having programs at the various State levels. So, as far as I am concerned, I think this is a very good pattern and a sound pattern and I think if we coordinate it properly, as Senator Anderson just discussed a moment ago, the bad effect of fragmentation would not occur.

Senator McGOVERN. Thank you very much.

Senator ANDERSON. Senator Jordan?

Senator JORDAN of Idaho. Mr. Secretary, of course in my State of Idaho we always have a tremendous interest in water resource development. We either have too little or on occasion we have too much, as we have had already this year in some parts of my State. I might say there is a great interest in my State in the proposal set forth in this bill. I would have a question for you with respect to the coordinating aspect that was mentioned. I am sure that it would be of great benefit to all people engaged in water research work if they had access to the work of other people also so engaged in order to avoid duplication in their effort and to achieve the utmost success in all lines.

I assume that your coordinator would first start out by taking inventory of all the research projects now going on? Would you comment on that?

Secretary UDALL. I think this would be an objective certainly, to pull together what you would call an inventory of what work is being undertaken so that there is one place that is fully informed on what the existing programs are. The bill provides that we keep a catalog of water research projects underway for everyone to use.

Senator JORDAN of Idaho. And there would be a very tremendous reciprocity of information between the several agencies of the Federal Government and the universities and the State resource agencies—

Secretary UDALL. That would be highly essential I would think, yes.

Senator ANDERSON. Might I just say I mentioned this agriculture research work a while ago because I was tremendously interested in it and I think the Department did an exceptionally fine job after I left it. We tried to find out what was going on. We found out that rain belt cotton takes dye a little bit differently, apparently, than irrigated cotton, or seems to, and some States were trying to make some study of the way in which irrigated cotton took dye and how it might be handled.

The State right next door to it was also conducting the same research and didn't know that the other State was already doing it. All the Department did was call attention to the fact that one State was doing it, and the other State was doing it. We asked if they wanted to get together and compare results, make their research money go further. The Department didn't interfere with a program in a single State. It merely pointed out that one State was doing it, the other State was doing it, too, and they then went on to see if they could work out an arrangement so their studies would supplement each other, using the medium of the Department to do it.

I don't think it is the intention of the Secretary of the Interior that he would sit down and divide up the pie and say, you do this in this State and something else in some other State, but I do think the process of keeping information can be extremely useful to all concerned, and if all States know what other States are doing, they can make their own research money go further than if they didn't know that, and hence duplicate a lot of work.

Secretary UDALL. Mr. Chairman, I would like to point out the way you have designed the bill we think is particularly good in this respect because there will be an initial grant to each of the land-grant universities to set up the program at a research center, get their program going, their personnel. Then there is also a fund set up which will be available in addition to that initial grant, and the universities

could submit proposals to us for additional research. We will analyze them and, of course, we will know, then, at a central location what is being proposed, and we naturally will coordinate the awarding of these contracts and grants for each particular proposal.

Senator ANDERSON. Senator Nelson?

Senator NELSON. I didn't hear all of your testimony but as to the allocation of \$100,000 a year to one college in each State, will they have to propose projects or will this just be pure research on their own?

Secretary UDALL. No. The initial grant to each of the land-grant colleges is for them to set up what you would call an institute or center. Some of them already have one but this is available to be sure that each of the land-grant colleges has a water-research institute established.

Then the next amount of money that would be available over and beyond that initial grant, would be money available to those centers to apply to additional research. A further sum could be allocated to these centers or other universities that would also be free to apply. As far as this last type of money is concerned it could be used for grants for particular research projects.

Senator NELSON. \$100,000 is a free grant?

Secretary UDALL. That is right.

Senator NELSON. With which they may do anything they please with it, in research?

Secretary UDALL. That is right, so long as they set up a water-research program.

Senator NELSON. They do not have to submit projects, proposals for study, to the Secretary.

Secretary UDALL. No, however, each such center would have to set up its research program.

Senator NELSON. Then as I read it, after that starting out at \$5 million a year and rising to \$10 million a year, the Secretary has the funds available for special projects?

Secretary UDALL. That is correct.

Senator NELSON. And will your office initiate projects as well as receive proposals from universities?

Secretary UDALL. The Interior Department will have responsibility for making suggestions to universities for research subjects. In addition, Dr. Wiesner and the other scientific people that I have talked to, feel that one thing that we have demonstrated in research in this country, in general, is that the best program is to have a strong, "in-house" program in the Federal Government. That is, the Federal agencies should have a strong program. Such "in-house" research programs are now underway and in existence within the Government agencies. They complement each other, that you have in a sense a rivalry, a competition, a production of a greater degree of effort and of greater excellence by this pattern rather than if you did it all either way.

Senator NELSON. But you will have \$10 million a year.

Secretary UDALL. That is right, for research under section 200 of this bill.

Senator NELSON. All I am saying is do you have the authority to initiate a proposal for research to be done by a university out of your own agency?

Secretary UDALL. Oh, yes, and I fully anticipate, for example, with programs that we have in my own Department, fish and wildlife and water fowl and reclamation, and so forth, we may have a water research problem that we may feel a State university could help on. Possibly because of work it has been doing, the university is better equipped than we are to undertake it, and maybe this problem has wide ramifications. So we would ask the State university if they are interested in a grant or contract to do this particular research job, and so on. It would work both ways.

Senator NELSON. Is water pollution within the purview of the studies that you propose to make?

Secretary UDALL. Well, we are certainly concerned with water quality. There are also many water pollution problems related especially to fish and wildlife and to commercial fisheries. It is often very difficult for me to draw the line distinguishing a pollution problem and some of the other water quality problems.

Senator NELSON. Is there any conflict between the—I just read this very quickly—authority to make grants in areas that aren't already being investigated by other agencies or departments. Am I correct in reading that some place here. What I am getting at is, it seems to me that there isn't any question but what a major, if not the major destroyer of fresh water assets in this country, is still pollutants, with sewage I think probably being second, and that it is having dramatically serious consequences, and now as a consequence in just an isolated case of detergents, the word "nonsoluble" ones, whatever the right word is, now polluting the underground resources all over the country.

I notice that West Germany passed legislation barring the non-soluble detergents from the market, I think a few years from now. But in our own State, which, along with Minnesota and Michigan, I should guess has more fresh water assets than any other State in the Nation, our own State, in somewhere around 60 counties we already find nonsoluble detergents in the underground water supply.

Now, it seems to me this is a crucial area in which we have to move very rapidly, maybe with legislation. I suggested in our State, to bar their use which would be very difficult to pass, but it seems to me it is a really critical problem. I was wondering whether you would have authority in that \$10 million annual appropriation to specifically move into this field yourself in addition to whatever work is being done by the Public Health Service and other areas.

Secretary UDALL. Well, the answer is yes, Senator, the Interior Department is deeply concerned with certain aspects of pollution. But the Department of Health, Education, and Welfare has the principal program in the pollution field.

Senator ANDERSON. I would hope it might be a qualified yes because certainly Health, Education, and Welfare has responsibility in this field, and if they thought this was a means to take over the study of water pollution, their report on this bill would be a little bit adverse, and I would want it to be. We have trouble enough with trying to conserve water without trying to decide whether Dash or All are better than Stream to keep it from bubbling up a little bit.

Therefore, the answer would be a qualified yes, wouldn't it? You do not contend with HEW, do you, Mr. Secretary?

Secretary UDALL. I have learned in my work with Dr. Wiesner—and I think setting up this Office of Science and Technology was a very wise step the President took—that some of these problems of overlap that we have had we can resolve very, very readily. There is a twilight area between water pollution and water quality and it is a rather—it is hard even for some of the scientists to differentiate. I have tried to pin them down, to get them to draw a line between what I would call a water quality problem and a pollution problem, where the line begins. There are, I think, certain types of pollution, industrial waste, for example. This is an area where there is a major problem, even in these areas that think they have a water surplus, yet I think one of the great forms of waste in this country today is the waste of water through industrial pollution particularly. It is just as bad as they way that we wasted our forests 75 years ago. We just consider that water is so abundant that we will waste it, and so we pollute it. And I think we are going to need all the efforts that we can make on the pollution front as well as all the efforts we can make in basic water research, too, and sometimes these inevitably do overlap, but this isn't a bad thing necessarily. The Interior Department approaches these problems principally in our studies of water quality and aquatic biology.

Senator NELSON. Mr. Chairman, the reason I raised the question, it is obvious from the bill—I don't have an opinion one way or the other—it is obvious from the bill that the 50 various State universities may engage in any kind of pure research they please relative to water, I would gather, under this bill. Therefore, some university decides to do research in the field of water pollution and in all States the problems differ.

We have one, for example, involving pollution of effluents from papermills. Well, the University of Wisconsin, which has done a lot of waterwork, may proceed in this field. You have \$10 million a year and you may like what they are doing here. This is industrial pollution. No one is raising questions whether or not you have authority, then.

Certainly then the universities under the grants here would have authority, I would gather, to do whatever research they please in any way affecting the quality of water, source of water, use of water.

Does your supplementary appropriation of \$10 million give you the policy authority to then say we would like to have you expand your program here at this university on industrial pollutants in some particular way?

Secretary UDALL. Senator, I think I can clarify the point this way, that this is a water research program we are talking about. It is not a program that is an attack on the methods particularly of curing industrial pollution, for example. There is a very aggressive program in the Department of Health, Education, and Welfare which they are administering. They are doing some very good work in some parts of the country. And I think this distinction is somewhat clearer if you keep in mind that this is research. Of course, some of this research is related to water quality and it will have considerable significance on the attack on pollution problems, yet research under this bill is not, as such, a program that is directed toward methods of solving the pollution problem itself. These take treatment works and,

you know, the sort of thing that many of the States now are engaging in.

Senator ANDERSON. I only want to say, Mr. Secretary, that one of the things that interests me is the fact that sometimes institutions close to each other do not know what one institution is doing or the other institution is doing. In my own State the school that used to be called New Mexico College of Agriculture and Mechanic Arts, now known as the New Mexico State University—I am sorry they dropped the word “Agriculture” from it—New Mexico State University would probably administer this act and they are very much interested in water research, particularly phreatophytes. And the school that used to be called the New Mexico School of Mining, but I believe is now called New Mexico Tech—they shift these names around very freely—is headed by Dr. Workman, who is one of the pioneers in study of cloud seeding in order to increase water supply, and other phases of weather modification.

I think it is important that the State schools, State universities which administer the programs, know that Dr. Workman is working on cloud seeding. I don't think they would start a program of study of cloud seeding because that is a sort of specialized field that General Electric and some of its people and some others have already worked in, and not everybody has experience in it. They know that there is an intent elsewhere to study the increase in water by use of cloud seeding and atmosphere physics.

Many times they didn't know it, although it was only a short distance away. It is useful for the general coordinating agency to know what is going on in the various State schools.

Are there additional questions?

Thank you very much, Mr. Secretary. We appreciate your being here.

Senator ANDERSON. Mr. Byerly is here from the Department of Agriculture. We are glad to hear from him.

STATEMENT OF T. C. BYERLY, ADMINISTRATOR, COOPERATIVE STATE EXPERIMENT STATION SERVICE, DEPARTMENT OF AGRICULTURE; ACCOMPANIED BY HARRY A. STEELE, ECONOMIC RESEARCH SERVICE

Mr. BYERLY. Mr. Chairman, I am T. C. Byerly, Administrator of the Cooperative State Experiment Station Service and I am accompanied by my colleague, Harry Steele of the Economic Research Service.

We support the purposes of S. 2. In our opinion its emulation in many respects of the Hatch Act of 1887 is a sound approach to the needed increase in Federal support for research on problems related to water resources in the land-grant colleges and universities and other designated research institutions. Federal grants expended in the State agricultural experiment stations under the provisions of the Hatch Act have been highly productive in terms of significant research results without restriction of the proper freedom of research workers in those stations to conduct their research according to sound scientific precepts. The Hatch Act assures the existence in each State of a research center competent in agricultural research, jointly sup-

ported by Federal and non-Federal funds and responsive to both local and national needs.

The State agricultural experiment stations conduct water resource research oriented to the needs of agriculture and rural communities in the broadest sense. Research in most of the areas designated in title I, section 100(a) is in progress at one or more of these stations. The total amount of such research is inadequate. S. 2 provides additional authority to increase it.

The problem of coordinating research authorized under title I, section 100(a) within the recipient institutions will be complex and varied. Water resources research in the agricultural experiment stations must be coordinated with all other water resources research in the parent institutions if the most effective use of all resources is to be achieved.

In some instances the college or university may elect to designate the agricultural experiment station as its water resources research center. Some of the stations now administer projects in several colleges, or divisions, or departments; at Michigan State University, for example. About 20 other institutions now have water research institutes; Oregon State University and Cornell University are examples. Each has met the problem of coordinating water research administered in the State agricultural experiment station and that located in other units of the university in its own way.

Senator ANDERSON. Did you indicate how many of these States are being handled this way?

Mr. BYERLY. With respect to water research institutes? I can examine for the record. I cannot now tell you exactly how many there are. There are other than the two I noted. Michigan State I mentioned as an example of experiment station doing work in several divisions. It does not as far as I know have a water resource research institute.

Senator ANDERSON. I was going to say nobody has a higher respect for the head of that institution than I do. I borrowed his brains every time I could when I was in the Department of Agriculture. He is a strong supporter of this bill.

Without objection, we will include in the record a letter I received from him on the bill last year.

(The letter referred to follows:)

MICHIGAN STATE UNIVERSITY,
East Lansing, Mich., July 20, 1962.

HON. CLINTON P. ANDERSON,
U.S. Senate, Washington, D.C.

DEAR SENATOR ANDERSON: This note acknowledges your letter of July 2 asking for our response to the draft bill which proposes the establishment of water resources research institutes at all land-grant colleges and State universities.

We see considerable merit in your proposal and endorse the general program which it seeks to realize. Through its proposed implementation, the draft bill takes cognizance of the fact that the use of water constitutes one of the most complex and pressing problems confronting almost every State in the country. The bill further recognizes that because of the complexities involved, and interdisciplinary approach is mandatory, that both basic and applied research are required, and that there is need to collect and disseminate important information pertaining to this whole problem. At the same time, the draft bill does not exclude the possibilities of supplemental funds not covered by the bill.

Your comments concerning the material submitted by our people in the institute of water research are appreciated. I am sure they would be happy to share with

others how Michigan State University is organizing itself to administer effectively its institute of water research. As indicated, we endorse the concept and general ideas expressed in the draft bill.

Sincerely,

JOHN A HANNAH, *President.*

Mr. BYERLY. I have known John Hannah for more than 30 years and I share your admiration for him.

Senator ANDERSON. We are happy to hear you say that. He is a very remarkable public servant

Mr. BYERLY. He is indeed.

Senator ANDERSON. And I am sure he feels this job is not being adequately handled in all of the States. In how many of them do you think—have you any idea in how many States it is being adequately handled?

Mr. BYERLY. Water resource research?

Senator ANDERSON. Yes.

Mr. BYERLY. I don't think it is being adequately supported in any of them. Does that answer your question?

Senator ANDERSON. Yes.

Mr. BYERLY. Agriculture's tremendous responsibility in the effective use of water is evident when we consider some of the data on water use and management. The average annual precipitation for the conterminous United States is 4.75 billion acre-feet. The first impact of this primary water supply is on the surface of the land. The nature of vegetable cover, slope, soil characteristics, cropping patterns, and conservation practices exerts the first determination whether precipitation becomes surface runoff, deep percolation, or soil moisture for evapotranspiration. The lion's share of this total water supply—3.38 billion acre-feet—presently is used by evapotranspiration from watershed lands. The remaining 1.37 billion acre-feet constitute the massed water supply available to the Nation. Irrigation agriculture is dependent on this supply and accounts for 90 percent of the water than is consumptively used. The efficiency of agriculture's water use—watershed and irrigation—is therefore very important to other uses.

Water research in the U.S. Department of Agriculture and the State experiment stations is concentrated on problems related to water and land management for plant growth and economic and institutional problems of water development and management. The Agricultural Research Service conducts a broad program of research in Department laboratories, in cooperation with other Federal agencies and in cooperation with State agricultural experiment stations on precipitation, evaporation, transpiration, water movement in soils, soil-water-plant relationships, watershed protection, erosion and sedimentation, upstream flood abatement, irrigation, drainage, and agricultural use of water of impaired quality. Agriculture conducts some research on phreatophyte control. It has been estimated that phreatophytes in the 17 Western States use more water than is withdrawn for public use in the whole United States of America. The Forest Service research emphasizes watershed protection, water yield, erosion and sedimentation, and upstream flood abatement. The Economic Research Service conducts research on the role of water in regional and national growth, on the economics of water development and management, watersheds, and water values, and on the economic

analysis of water institutions. The State agricultural experiment stations use Federal-grant funds appropriated under the Hatch Act, together with State and other non-Federal funds and grant funds from other Federal agencies, to support a broad program of water resource research. Areas of emphasis include water movement in the soil, soil-water-plant relationships, water yield, irrigation and drainage, and the economics of water management and development. Some research on recreational use of water is underway.

The U.S. Department of Agriculture and the State agricultural experiment stations have planned comprehensive programs of basic and applied research on the management and use of water on crop, forest, and rangeland watersheds. Public Law 87-788, the Cooperative Forestry Research Act, provides additional authority for appropriations of grant funds to designated State research institutions for forestry research, including water resource research. The U.S. Department of Agriculture has built 10 new soil and water research laboratories, 4 water hydrology installations, and 5 forest laboratories at field locations at a total cost of \$10.3 million during the period 1958-62. Funds for three new or expanded soil and water laboratories at a cost of \$920,000 and three forest laboratories at a cost of \$825,000 are included in 1963 appropriations. Additional research is urgently needed to facilitate optimal patterns of alternate and multiple use of water for agricultural, industrial, domestic, and recreational use. Basic research on water movement into and through soils and into and through plants is needed to make agricultural use of water more efficient.

We have noted the language of section 100(a), which stipulates that research conducted under authority of S. 2 shall have due regard to research being conducted by agencies of the Federal Government and that being conducted by agricultural experiment stations. As emphasized by the Senate Select Committee, it is highly desirable that a Government-wide scientific water research program be developed. This means that in addition to grants to State universities, in-house water resource research oriented to the missions of the Federal agencies and the water resource research of the agricultural experiment stations must receive full and adequate consideration in planning future water research budgets. The Department of Agriculture is concerned that the proposed bill covers only a part of the total coordinated program of scientific research on water as requested by the Senate Select Committee on National Water Resources.

We strongly support title II, section 200. Similar authority to make grants for mission-oriented research is needed by the U.S. Department of Agriculture. Current project grant authority is limited to the provisions of Public Law 85-934, which provides such authority only for basic research. No funds have been made available for grants under this authority in the U.S. Department of Agriculture, and the authority of the Hatch Act of 1955 which provides authority for grants for regional research projects recommended by a committee of nine persons elected by the experiment station directors and to a limited authority in the Forest Service under the Whitten Act. Such funds under the regional research portion of the Hatch Act are limited to 25 percent of the fund appropriated under the Hatch Act. The U.S. Department of Agriculture needs additional authority, especially for mission-oriented project research grants.

We recognize the need for cooperation, coordination, and communication, the purposes of title III, section 300. We question whether it is the most effective form of organization to authorize one of the departments participating in water research to exercise a coordinating role in relation to the activities of other departments. We suggest that this coordinating role might more properly be exercised by the Executive Office of the President. Information storage and retrieval with respect to current research can be expedited by the Science Information Exchange.

Senator ANDERSON. Could I ask you just where in the bill you find this authorization for the Department of the Interior to exercise a coordinating role over the activities of the other departments? Would you read the language?

Mr. BYERLY. Mr. Chairman, in reading the language of section 300, it seems to me that it does in fact provide that.

Senator ANDERSON. Just read the language, if you will, please, sir.

Mr. BYERLY (reading):

He shall make generally available information and reports on projects completed, in progress, or planned under the provisions of this Act, in addition to any direct dissemination of information by the research agencies themselves. Each Federal agency doing water resources research or investigations shall advise the Secretary of the Interior at least once annually of work underway or scheduled by it. The Secretary of the Interior shall classify and maintain for general use a catalog of water resources research and investigation projects—

And then—

Senator ANDERSON. Is that your idea of coordination?

Mr. BYERLY. No. There is one other portion.

Senator ANDERSON. I mean just cover this one. Is this your idea of coordination?

Mr. BYERLY. Sir, this is not my idea of total coordination.

Senator ANDERSON. Is it any kind of coordination at all?

Mr. BYERLY. I beg your pardon?

Senator ANDERSON. Is it any kind of coordination at all? Are you familiar with the Agricultural Act of 1946?

Mr. BYERLY. Yes, sir.

Senator ANDERSON. Does that provide complete coordination? Does it attempt to catalog research facilities? Do you remember anything about the adoption of it? Were you there at the time?

Mr. BYERLY. I was present at the time, yes, sir, but not close to it.

Senator ANDERSON. Do you remember how many yards and yards and yards of material we got ready as to what was going on in other departments?

Mr. BYERLY. Yes, sir.

Senator ANDERSON. Did we attempt to coordinate the programs in any of those other departments?

Mr. BYERLY. No, sir.

Senator ANDERSON. Well, then, the collection of information is not coordination, is it?

Mr. BYERLY. The collection of information itself is one of the steps of coordination; yes, sir. Communication and information is a step in coordination and an essential step in coordination.

Senator ANDERSON. Do you think that the Agricultural Act of 1946, the collection of this information, was an attempt to coordinate, was a first step in coordination?

Mr. BYERLY. I am a little confused, Mr. Chairman, as to whether you refer to coordination within the Department of Agriculture and coordination of the work of the Department of Agriculture and the State experiment stations or coordination among the executive agencies.

Senator ANDERSON. I am only reading what happens to be in the letter that Mr. Freeman sent from the Department and he said:

We question whether it is the most effective type of organization to authorize one of the departments participating in water research to exercise a coordinating role in relation to the activities of other departments.

Now, that says exercise a coordinating role. That is what I want to talk about, whether it is a first step or some other.

Mr. BYERLY (reading):

to assure that the programs authorized in this Act will supplement and not duplicate established water research programs, to stimulate research in otherwise neglected areas, and to contribute to a comprehensive, nationwide program of water and related resources research.

Sir, in my opinion that conveys authority for coordination.

Senator ALLOTT. Where are you reading from?

Mr. BYERLY. Section 300, sir, beginning at line 25, the last statement.

Senator ALLOTT. Starting at line 25.

Mr. BYERLY. Yes, sir.

Senator ALLOTT. All right.

Senator ANDERSON. I thought that started off:

The Secretary of Interior shall arrange for the regular advice and cooperation of all agencies in the Federal Government—

For this purpose, not for itself.

Mr. BYERLY. Yes, sir. He shall arrange for it, and to me, sir, that is a coordinating role which should better be vested in the Office of the President.

Senator ANDERSON. Your objection, then, is to where it is located.

Mr. BYERLY. Oh, yes. Not at all that it ought to be done. I am very much in favor of coordination being done.

Senator ANDERSON. This was put in so the Secretary of the Interior could get information on what other agencies were doing so he could judge his program accordingly. He would not be interested in the slightest in other things they are doing. I don't think there is any intention to do this in this bill.

All I can say is that I hope we learn by experience. I hope that I did, at least, and I think one of most interesting experiences that I had in the Department of Agriculture was in collection of the material in connection with the passage of the Agriculture Research Act.

I thought it was a somewhat important step. I thought it was a useful step. It didn't have its value because of what the Department thereupon did to the State schools but by virtue of what it found out was going on, so it might make suggestions to do things they should look at.

I don't know what happened after I left the Department. I only know what happened up to the time I left and that since that time I have never had a letter from one school in the country saying that particular research act was used to crowd down on them programs that they didn't want and deprive them of programs that they did want.

If you have information to the contrary, I wish you would send it to me.

Mr. BYERLY. Sir, I hope there is no information to the contrary. We take pride in the fact that the latitude to the State experiment stations to conduct their programs of research is very broad indeed and we do try through evaluation and through communication to provide information so there will not be unnecessary duplication on those programs.

Senator ANDERSON. Senator Allott?

Senator ALLOTT. Mr. Chairman, since this question has been raised, I think we should try to lay it at rest either here or later. I would like to point out to the witness, referring to the section you just referred to, let's read it carefully:

The Secretary of the Interior shall arrange for the regular advice and cooperation of all agencies of the Federal Government concerned with water problems, of State and local governments and of private institutions and individuals, to assure that the programs authorized in this Act will—

“Authorized in this Act.”

Senator ANDERSON. “This Act.”

Senator ALLOTT (reading):

will supplement and not duplicate established water research programs.

Now, I must confess that perhaps we should pay attention to making this clearer, if possible, but it seems to me that the way this is read, while one interpretation could be made like the witness has, I certainly would not put that interpretation on it, particularly since it says that the programs authorized in this act will supplement, and it doesn't go beyond that phase. I don't think it authorizes him to go into programs of other agencies.

Senator ANDERSON. Let me say to my friend from Colorado, who is a very good lawyer and useful member of this committee, that he has found on occasion, too, it is well to protect these points as we go along. I want to assure the witness that the exact thought that Senator Allott had was in our mind, that this covers programs authorized by this legislation, doesn't interfere in any way with any other programs you now have. If you started to put the Department of the Interior to controlling agricultural research, as it now exists, I am sure the witness knows who the strongest opponent would be because I don't believe in that at all. But I do say things authorized in this legislation ought to supplement and ought not to contravene and ought not to reflect in any way on the regular programs now going on in these other departments.

That is the reason I answered as I did a moment ago about water pollution. I think HEW is working in that field and I would hate to see the money in this program used to sort of dip into the water pollution program because I believe that belongs where it is.

If there is some special study that might be made that would have some bearing on that and HEW said, we would like to know what is happening in a certain part of the world, fine. But I am glad Senator Allott brought this out because we are only trying to deal with programs authorized in this act and I hope the legislative history would be sufficiently clear on that point, and I appreciate the Senator from Colorado making it, I think, clear. We don't intend to interfere in any way with programs already existing.

Mr. BYERLY. I thank the Chairman and the Senator from Colorado for the statement, sir.

Senator ANDERSON. Senator Moss?

Senator MOSS. I do not have any questions. I am interested in the discussion here on the point. I agree we should clarify it fully so that there won't be any doubt remaining about superseding any of the research activities that are now being carried on.

Senator ANDERSON. Senator Jordan?

Senator JORDAN. No questions.

Senator ANDERSON. Senator McGovern?

Senator MCGOVERN. Mr. Chairman, with regard to the point that has been under discussion, it seems to me that if there is any doubt about it, it would be cleared up in section 301. I think the only practical danger stemming from the point that the witness has made is that the existing authority of some department might be diminished by this act. But it is spelled out very clearly in section 301:

Nothing in the foregoing section nor in this Act is intended nor shall be construed as giving its Secretary or the Department of the Interior any authority or surveillance over water resources research conducted by any other agency of the Federal Government.

It seems to me this language is very clear.

I have no further questions.

Senator ANDERSON. No further questions. Thank you very much. Again I want to assure you that I appreciate all the fine research going on through the Department of Agriculture. A very fine piece of work was done by the Department in drafting the Agricultural Research Act of 1946, and by longtime employees who know what they were doing when they got it all together.

Senator ANDERSON. I have just received a statement from Senator Bartlett supporting S. 2. Senator Bartlett had hoped to be here. We will put his communication, including a letter from the president of the University of Alaska, in the record.

(The letter referred to follows:)

U.S. SENATE,
February 20, 1963.

Senator CLINTON P. ANDERSON,
Chairman, Senate Interior and Insular Affairs Committee.

DEAR MR. CHAIRMAN: I am pleased to be a cosponsor of S. 2, a bill to assist the establishment of water resource research centers at State universities; to promote a more adequate national program of water research; and to provide for the training of research personnel.

This bill is important to my State of Alaska and to all the States. I congratulate you and your committee, Mr. Chairman, for giving this measure the priority consideration it so clearly deserves.

The bill before the committee is a modest proposal concerning a major problem. The problem, of course, is how efficiently to utilize our water resources and how best to provide for their proper conservation. The proposal is not a solution to this problem—nor is it intended to be. When solutions are found however, they will be found by personnel trained under the provisions of S. 2, utilizing techniques and equipment developed in S. 2 laboratories.

The research centers which this bill provides for are modeled after the wholly successful program of State agriculture extension services. Funds—not more than \$100,000 per year—would be provided to the several States for use in the establishment of a State water center. This bill also provides for specific grants-in-aid for particular research projects. It is the hope of the sponsors of this legislation that it will encourage and develop the training of scientists and personnel equipped to work in the area of water research.

I am hopeful, Mr. Chairman, that the committee will make very clear that S. 2 will not conflict with—but will rather complement—research programs al-

ready undertaken by the Federal Government in water use and conservation. It should also be made clear that it does not interfere with studies now under way, with Federal, State, and local participation, into the economic needs and development of river basins.

For example, under the terms of the Federal Water Pollution Control Act, seven water pollution laboratories are to be constructed at sites across the country. Alaska is fortunate to have been selected as one of the sites and the fiscal 1964 budget now before the Congress includes funds for the construction of this laboratory. It is clear, I believe, that should the University of Alaska undertake to set up a water resource research center using S. 2 funds there would be ample opportunity for coordination and cooperation between the two facilities.

The Alaska congressional delegation has been working closely with the executive branch in an effort to establish a joint Federal-State planning commission to attempt a coherent projection of the economic development of Alaskan resources. Such a study would, of course, include water use and would have ample reason to work closely with, and to profit from, a State water research center.

The University of Alaska is greatly interested in S. 2. Enclosed you will find expression of this interest, a letter from the president of the university, William R. Wood. I would appreciate your making it a part of the committee record on the bill.

Sincerely yours,

E. L. BARTLETT.

UNIVERSITY OF ALASKA,
College, Alaska, February 12, 1963.

Hon. E. L. BARTLETT,
U.S. Senate,
Senate Office Building, Washington, D.C.

DEAR SENATOR BARTLETT: I have read with much interest the copy of S. 2. "A bill to establish water resources research centers at land-grant colleges and State universities," which as a cosponsor you sent to my office. The bill has been reviewed in detail by a number of our faculty, including Dr. Kenneth Rae, director of the institute of marine science, Dean Earl Beistline of the College of Earth Science and Mineral Industry, and Dr. C. T. Elvey, vice president for research and advanced study. All of us are keenly interested in the intent of S. 2 and are in strong support of its several provisions. We believe that a program such as the one proposed would complement the work that is in prospect in water-pollution studies by the U.S. Public Health Service, and could become an important part of the total Arctic research program which we are attempting to develop.

I am enclosing a copy of a letter from Dr. Elvey to Senator Anderson concerning the interest of the University of Alaska in water resources research. These, I am certain, you will find of interest.

Sincerely yours,

WILLIAM R. WOOD, *President*.

Senator ANDERSON. Mr. Sam Thompson, director of the Mississippi Water Board, for the Interstate Conference on Water Problems of the Council of State Governments. Mr. Thompson is a longtime friend of many of us here.

STATEMENT OF SAM THOMPSON, DIRECTOR OF THE MISSISSIPPI WATER BOARD, FOR THE INTERSTATE CONFERENCE ON WATER PROBLEMS OF THE COUNCIL ON STATE GOVERNMENTS; ACCOMPANIED BY DR. MITCHELL WENDELL, COUNCIL OF STATE GOVERNMENTS

Mr. THOMPSON. Thank you, Senator. I have with me Dr. Mitchell Wendell, staff member of the Council of State Governments, who worked with the policy committee in developing our policy position in this statement.

My name is Sam Thompson and I am appearing on behalf of the Interstate Conference on Water Problems. This Interstate Con-

ference on Water Problems is a national organization of State officials concerned with all phases of water resources planning development, use, and administration. Consequently, the conference is vitally interested in the improvement of water research programs and in legislation designed for this purpose. We appear in support of the objectives of S. 2 and wish to offer the following observations on the problem to which it is addressed, and on certain of the bill's provisions.

With ever-increasing demands on our water supplies, the need to have complete information concerning our water resources and the most efficient means of using them grows. For the Nation as a whole, it seems unlikely that we will have an actual shortage of water in the predictable future. However, a usable abundance depends on proper distribution of the available supplies of water, upon optimum management of the supply, and upon constant improvement of techniques for using and reusing water. We have learned a great deal about hydrology and other water resources matters, but in important respects our information and know-how are still inadequate.

Essential to any program of water resources research is basic data collection. No program can be any better than the raw material it has to work with. Basic data collection has been carried on by the U.S. Geological Survey and the States on a cooperative basis, with matching funds and close cooperation of Federal and State personnel. It is our understanding that the research authorized by S. 2 would be in addition to, and not in substitution for or replacement of, the cooperative basic data collection program. Continuation and expansion of the existing program is of the first importance, and it would not be wise to sacrifice or impair it in order to devote funds and personnel to some other type of effort. On the other hand, provision for broadened water research programs, while safeguarding the continued development of the existing cooperative Federal-State program would be very worth while.

The idea of State or regional institutes connected with colleges or universities is a good one. Despite the fact that much of the results of research will be applicable throughout the country, many of the physical aspects of the contemplated research must be undertaken in the geographic areas concerned. Also regional variations in water resources problems can be better reflected by State or regional institutes than they could be by a single consolidated facility, however excellent. We are especially glad to note that the bill expressly recognizes that either land-grant colleges or other institutions of higher learning could be the appropriate location for research activities of the types contemplated, and that each State is given an opportunity to decide where its institute would be lodged.

In this connection, however, the bill could give greater recognition and prominence to existing public and nonprofit water research agencies. Some of them are attached to State or private universities. Others exist as non-university-connected departments, boards or commissions of State government. While the facilities of a college or university are highly useful for research activities and will strongly impel States to locate the institutes provided by this proposed legislation on university campuses, the objective of the bill is to promote water resources research in whatever way is most efficient. Conse-

quently, we would suggest that the committee consider modifying the opening language of section 100(a) so as to permit the operation of institutes in States under any suitable administrative pattern, particularly where a nucleus of competence or a material volume of research data are already available. Several conforming changes would have to be made in the title and other parts of the bill if this were done. Emphasis could still be placed on colleges and universities by mentioning them specifically as among the suitable locations for the research work.

Also, we wish to commend the sponsor and supporters of the bill for making express provision for States to establish joint facilities on a regional basis. In particular instances a State may find it most suitable to have a research facility whose territorial service area is coincident with the boundaries of the State; in other circumstances, larger service areas—perhaps a river basin or group of river basins—will be more economic or convenient. Encouraging States to engage in cooperative undertakings, wherever appropriate, without penalizing them financially for doing so is a constructive approach.

The problem of effective use of research funds and personnel has another aspect. The language of the statute should provide means for avoiding duplication of research activities, both as among institutes in the several States and among institutes and other Federal and non-Federal research agencies. In addition to the notice already taken of this problem in the bill, we suggest that the statute might provide for a committee of officials from States participating in the program with which the Secretary could confer in order to shape the various parts of the research activities carried on pursuant to this legislation in ways that would make them complementary, rather than duplicative, but without imposing restrictions on initiative to devise and execute research.

At its December 1962 meeting, the Interstate Conference on Water Problems adopted a resolution dealing with water resources research. It is as follows:

RESOLUTION ADOPTED BY THE INTERSTATE CONFERENCE ON WATER PROBLEMS OF THE COUNCIL OF STATE GOVERNMENTS REGARDING WATER RESOURCES RESEARCH

Whereas the constantly increasing demand upon the Nation's water resources necessitates an immediate and pronounced acceleration of water resources research; and

Whereas the States have a responsibility to aid in the solution of problems requiring research; and

Whereas there was introduced in the 87th Congress legislation which could be helpful in promoting such research and in assisting the States in discharging their responsibilities: Now, therefore, be it

Resolved by the Interstate Conference on Water Problems meeting in Chicago, December 5, 1962, That the States are urged to increase their support of coordinated programs of water resources research; and be it further

Resolved, That the Congress is urged to give favorable consideration to legislation providing for distribution of sums for research in furtherance of programs developed by a qualified college or university in each State and Puerto Rico, or such other substantially equivalent arrangement as the State may determine, such distribution to be made only after consultation with the Governor or appropriate State agency as the Governor may direct and for programs of coordinated research or for programs which are compatible with coordinated research programs.

Mr. THOMPSON. If the Interstate Conference on Water Problems can be of any assistance to the committee in the further development of this legislation we will be happy to cooperate with you.

We wish to thank you, Mr. Chairman, and the members of your committee, for the opportunity to express our views on this important legislation.

Senator ANDERSON. Thank you, Mr. Thompson, for a very fine statement.

I want to call your attention to the fact that the bill does permit arrangements with the educational institutions, private foundations, with private firms and individuals. So the Secretary could make as broad as possible use of the funds given to him.

Senator MOSS.

Senator MOSS. No questions, Mr. Chairman.

Senator ANDERSON. Senator Burdick.

Senator BURDICK. No questions.

Senator ANDERSON. Senator Church.

Senator CHURCH. No questions.

Senator ANDERSON. Thank you very much for your testimony, Mr. Thompson. It has been extremely interesting and helpful.

Mr. Kimball, I am happy to see you here.

STATEMENT OF THOMAS L. KIMBALL, EXECUTIVE DIRECTOR, NATIONAL WILDLIFE FEDERATION

Mr. KIMBALL. I am Thomas L. Kimball, executive director of the National Wildlife Federation. I appreciate this invitation and opportunity of commenting briefly upon S. 2, to establish water resources research centers at land-grant colleges and State universities to stimulate water research at other colleges, universities, and centers of competence, and to promote a more adequate national program of water research.

By way of identification, the National Wildlife Federation is a private organization which utilizes educational means to attain conservation objectives in the public interest. Among the 51 independent affiliates of the National Wildlife Federation are conservation organizations located in all States and the District of Columbia. An estimated 2 million persons are included among those who make up these affiliates and otherwise support programs of the National Wildlife Federation.

Conservation groups long have recognized the need for additional research on water resources and were pleased that the Senate Select Committee on National Water Resources, after exhaustive study, saw fit to recommend such a program. We believe S. 2 would implement this program and the National Wildlife Federation is in accord with its principles.

Persons concerned with natural resources are aware of the many valuable contributions made to agriculture by research conducted at experiment stations. Many observers, in fact, attribute this Nation's leadership in agricultural production at least in major part to studies and investigations of these institutions.

Senator ANDERSON. Let me interrupt you to observe that it is not only the experiment station, it is the work of the extension services that carry the work of the experiment stations into the home.

Mr. KIMBALL. That is right. I think that emphasis needs to be applied, it is the application of that research.

Senator ANDERSON. The experiment station is useful, but it is made useful by carrying the information all the way through from the Department in Washington to the State land-grant colleges, through the extension services and right into the home of the farmer. I think that has been the great glory of that whole experimental work.

Mr. KIMBALL. We are confident that a program for water research along the same general lines also will pay rich dividends, directly in more efficient management of the resource and, indirectly, in training of persons with professional competence in the field. Land-grant institutions offer unique opportunities for a combination of education and research.

In view of the importance of water resources to almost all facets of life, the program proposed in S. 2 appears modest and reasonable.

The National Wildlife Federation believes in the multiple use of water for domestic purposes, for agriculture, for industry, for essential power generation, navigation, wildlife, and recreation. Our principal interest, of course, is in public outdoor recreational opportunities and we urge the committee to make it clear in both its report and in the approved version of the bill that water research shall be authorized and directed in these areas as well as for other purposes. The public has a real and demonstrated interest in water-related recreations such as fishing, hunting, boating, swimming, et cetera, which can benefit from research. And, as a general rule, these recreations do not constitute uses which consume or damage the water for other beneficial purposes.

To illustrate one of our areas of concern, Mr. Chairman, I might point out that the National Wildlife Federation believes many large impoundments could offer additional public recreational opportunities if the production of game fish is increased. Much remains to be researched and investigated, however, on the management of these large bodies of water. While the management of farm ponds and small lakes has been the subject of much study, considerably less is known on what needs to be done on large impoundments to maintain fishing success at a high level. Production may vary widely within soil types, water qualities, pollution, and a host of other factors. Solution of such problems, when correlated with proper water resource planning, would be proper objectives of research centers.

In conclusion, Mr. Chairman, we hope early favorable consideration is given to this proposal.

Thank you for the opportunity of appearing.

Senator ANDERSON. Thank you very much.

Do you happen to know which State of the Union has the largest number of pleasure boats per capita?

Mr. KIMBALL. I believe it is Arizona.

Senator ANDERSON. I believe it is, too, at least I hope it is, because I said so in a speech a few days ago.

What I am trying to say is that in the early days, certainly only a few years ago when we were concerned with conduits and dams and the Salt River irrigation project, we weren't concerned with the recreation values, and now we find that the recreation values are extremely important. I hope the San Carlos Apaches in Arizona have learned that the land along the streams in Arizona is far more valuable for use for recreation than for any other purpose, and they can rent it to

people from Phoenix and take revenues from it. I am glad you stated it in this hearing today.

Any questions?

(No response.)

Senator ANDERSON. Thank you very much for coming.

Mr. Spencer Smith?

I am glad to see you here, Mr. Smith.

**STATEMENT OF SPENCER M. SMITH, EXECUTIVE DIRECTOR,
CITIZENS COMMITTEE ON NATURAL RESOURCES**

Mr. SMITH. Thank you very much, Mr. Chairman.

I am Mr. Smith, executive director of the Citizens Committee on Natural Resources, which is a national conservation organization. We have on the board of directors some of the outstanding conservationists in the Nation. Our chairman is Dr. R. M. Gibbons.

We want to commend you, Mr. Chairman, and the many people who have fostered the study of water conditions and are responsible for the introduction of this legislation.

One of the things that we were somewhat concerned about when it first went out was whether, since it involved land-grant colleges, this was going to be strongly oriented to agriculture only. We are very pleased with the broad gage that this legislation has.

We want to call special attention to the message that the chairman of this committee gave to the Senate on January 14 in which he points out:

The principle of multidisciplinary or collegewide agencies—
which will be involved in this study—
has received general endorsement.

We want to emphasize at this time that in many instances in the past, at least as far as the administration was concerned, water was thought of primarily in connection with agriculture or engineering, and we are pleased with this bill that takes the broad look that it does.

I want to quote again, if I may, from your statement of January 14, which I think highlights our particular interest in this bill:

Engineers, hydrologists, and physical scientists will not be required for all of the projects undertaken, nor for all of the tasks of training needed personnel which are involved. Water problems are social as well as physical. There is a great deal we need to know about the economic value of water in alternative uses, about the suitability and adequacy of our divergent systems of riparian and appropriation rights in water law, about the efficiency and effectiveness of the social and political institutions which administer water, the social and economic objectives of water resources development, the economic effects of interbasin transfers, the potentialities of flood plain zoning, methods of evaluating the use of water for recreation and scenic preservation * * *.

One of the gentlemen who called our office was originally concerned as to whether such things as wildlife, recreation, and scenic values were going to be properly considered with such research. And when we pointed out that Senator Anderson was the author of the bill he said:

I feel a little better about it, because I know his sincere interest in wilderness preservation and recreation and others, and I know that this is adequately provided for.

So I think we have a great deal of trust simply in the authorship of the bill.

I might mention also that this bill does have three significant programs for water research. The one that has received the most attention, and rightly so, is Federal assistance to the land-grant colleges. It has been my understanding—and I have served on the faculties of land-grant colleges—administrators of these colleges have been anxious to broaden the scope wherever possible, and they are constantly pressing for this. In some cases I would be less than candid if I did not say that there was some restraint placed on them by the governing institutions or governing bodies. But I do feel that the emphasis has been—certainly within the last two decades—land-grant colleges haven't tried to think of these things as parochial problems but broad social problems. And we are very pleased to see that they are starting or will start if this bill is enacted, a program of water research to provide us with a really excellent corps of people trained in water management.

I was especially interested in the comments by Senator McGovern, because time and time again when money is available for certain kinds of water research it is pointed out that technical people are not available. And this takes a long look and gets us a pretty good study of problems that come in the future by people in many different disciplines who have a water consciousness and have the professional capacity to deal with some of these problems.

I want to call attention especially—and maybe I misread the bill—I was pleased at the colloquy between the Senator and the representatives of the Department of Agriculture, because I had looked upon this catalog of information as one of the fine parts of the bill. And I know the Senator is aware of our constant hounding everybody for information on this, and trying to find some centrally located place that brings these things together. As I interpreted the bill, it is primarily for guidance of the Secretary of the Interior, and not necessarily to coordinate or to say to another Federal agency that it could or couldn't do this, but to say that these programs—I have now information that these programs are going on in a few weeks, and I will be guided by them in the way I administer other additional water resources funds provided for in the bill, or the matching grant, \$5 million, and I would presume that the Secretary would not intentionally duplicate something that is being carried in another Federal agency.

Senator ANDERSON. I want to thank you for that observation, because that is the purpose of the bill. I do feel that the Department of Agriculture was well within its rights in trying to get some legislative history which would show that to be the purpose. As for myself, I don't think anybody needs to question how I feel about it, because I have the kindest feelings toward the Department of Agriculture and its staff and the wonderful work it does. There is no intent on my part to cut the existing programs there. But at the same time, we are having a dam built out in New Mexico on the Rio Grande that could have a recreation value if 50,000 acre-feet is provided for a permanent pool, and maybe the operation loss per year will be 5,000 acre-feet. I think that 5,000 acre-feet could better be used there than for agricultural purposes around Albuquerque and

the Central Rio Grande Valley. It will bring a greater economic return. I introduced a bill to provide the needed water in which the city of Albuquerque, which is growing rapidly, seems to be very much interested. The city is taking steps to release some of the water assigned for the city's use for this purpose of filling the dam for recreational purposes. A study made at the University of New Mexico just recently indicates that while the agricultural value of that water is high, the recreation value is many times higher. We don't intend to disturb the agricultural possibilities. We have got plenty of those. But we do need this recreation resource lying close to our city line.

Mr. SMITH. I think this is one of the things that we can get excited by in this bill. In many instances this will place many of the values that the Senator knows that we are concerned about up for consideration and research. I noticed just recently a report, a water planning and research report that came out of the State of Texas. None of the values that we have been mentioning here today were involved in this report. And while it is not our purpose to exclude other very important values, it certainly is our purpose to hope that the things that we are concerned about here are included. This is one of the reasons for our interest in this bill.

Mr. Chairman, at this time I would like very much—it may be impertinent, but I don't mean it to be—but in all the discussions I have had in my college about S. 2, one of the basic documents we have used for reference is your speech to the Senate of January 14. I would like to recommend that this be placed in the record at this time, because it provides an excellent source for our review, and it may serve the same purpose for the people reading committee reports.

Senator ANDERSON. I am a little prejudiced, I will admit; so, without objection, that will be done.

(The excerpt from the Congressional Record referred to follows:)

[From the Congressional Record, Jan. 14, 1963]

ESTABLISHMENT OF WATER RESOURCE CENTERS AT CERTAIN COLLEGES

Mr. ANDERSON. Mr. President, I send to the desk for appropriate reference a bill to establish water resources research institutes or centers at land-grant colleges and universities, to stimulate water resources research at other institutions of higher education, and to promote a more adequate national program in this field.

I request unanimous consent that the bill lie on the desk for 3 days to permit any Senators who wish to do so to join in coauthorship of the measure.

The first draft of this bill was introduced in the 87th Congress on July 27 of last year. I then announced that it was introduced for the purpose of study, to stimulate discussion, obtain the views of the agencies in the executive branch of the Government, and to become a vehicle for the preparation of a revised bill for presentation to this Congress.

The response to the study bill has been a stimulating experience.

Comments and suggestions have come from every corner of the country, and they have been almost invariably constructive. Many have been incorporated in the revision. Without any exception, the basic plan in the bill to stimulate water resources research in colleges and universities, where it will help to produce much-needed, highly trained personnel in the water field, has been warmly endorsed and supported.

The principle of multidisciplinary or collegewide agencies has received general endorsement.

The sums proposed to be authorized for the research programs have not been criticized. We have been advised that they are modest in comparison to expertly estimated needs for college and university located research on water problems, but not so modest that they will not permit substantially adequate begin-

nings of a program which is expected to stimulate and attract matching funds from other sources.

THE WATER RESOURCES SITUATION

Before dealing in greater detail with this water resources research bill, we should review briefly where we stand as this session of Congress opens in relation to water resources to meet the Nation's growing needs.

In January 1961, under the leadership of the greatly missed Senator from Oklahoma, Robert S. Kerr, the Senate Select Committee on National Water Resources warned us in its final report that we will have abundant water supplies in the years ahead only if we conserve them and manage them wisely.

Full development of all available supplies is going to be necessary to meet the needs in 1980 of five major river basins, or areas: the South Pacific area in California, the Great Basin in Nevada, the Rio Grande-Pecos, the Lower Colorado, and the upper Missouri River Basins.

Another three great water areas will be at the limit of their supplies, with full development, by the year 2000. This group includes the western Great Lakes area composed of Michigan, northern Indiana, most of Illinois, and eastern fractions of Wisconsin and Minnesota. It also includes the western gulf area in Texas, and the upper Arkansas-Red River Basins involving major parts of Colorado, Kansas, and Oklahoma, and smaller sections of northeastern New Mexico and northern Texas.

Briefly, by the year 2000 the western half of this Nation excepting the upper Mississippi, the immediate Mississippi River drainage area, the lower Missouri and the Columbia River Basin will have come to the end of presently available water resources. The rest of the Nation will be struggling with conserving, purifying, recycling, and transporting water to points of need with investments in water facilities running well over 10 or 15 billion 1961 dollars per year.

Some of us are right now at the bottom of the barrel. The San Juan-Chama project in New Mexico will develop our last major available water supply unless and until we can purify brackish waters. In Arizona, 60 percent of water needs are being met from ground water sources which are being pumped out far faster than they are replenished. Southern California is now importing water, planning to import more from the northern end of the State, and hoping the Supreme Court will permit it to have more from the Colorado River Basin despite an adverse report of the Court's master in the case.

Totally, America has an abundance of water to meet her needs for centuries to come if the water and population are managed right. It will require enormous investments, at best, to manage properly. We are right now eyeball-to-eyeball with shortages, and in many areas we cannot afford enough time to blink. We must invest in water development and research or stagnate.

SELECT COMMITTEE RECOMMENDATIONS

The Select Committee on National Water Resources, on which I had the honor to serve with Senators Kerr, Murray of Montana, Chavez, Ellender, Magnuson, Jackson, Engle, Hart, McGee, Moss, Kuchel, who was vice chairman, Young of North Dakota, Schoepel, Case of South Dakota, Martin of Iowa, and Scott of Pennsylvania, made five recommendations. These included:

First, development of comprehensive water development and management plans for every major river basin in the United States by 1970.

Second, a 10-year program of financial aid to States to help them become active participants in the big planning job.

Third, a greatly expanded and comprehensive Federal program of scientific research on water, probing ways both to increase our supplies and to increase the efficiency of our use of available supplies.

Fourth, preparation of a biennial Federal assessment of the water demand-supply situation in each of the water resource regions of the United States so we will know where we stand, starting this year.

Fifth, Federal-State cooperation in a program to encourage efficiency in water development and use.

President Kennedy took the initial steps to implement these recommendations during his first month in office. In February 1961, in his resources message, he advised that he had asked the National Academy of Sciences to give him a report on the situation in respect to scientific research on all natural resources. He had also asked the Council on Science and Technology to provide an interim report on water research.

THE WATER PLANNING ACT

In July of the same year—1961—he sent to Congress a draft of a Water Resources Planning Act to provide the machinery for development of major river basin plans by 1970, and to provide the recommended aid to the States for participation in planning work.

Despite a great divergence of views about who should do our river basin planning, and a feeling in many quarters that agency and departmental competitions in the water field make the achievement of the task of coordinated planning in a reasonable period of years absolutely impossible. I have a great deal more than bare hope that the 88th Congress of the United States will solve this puzzle and get such planning underway on the basis of President Kennedy's bill.

The Interior and Insular Affairs Committee sat jointly with the Public Works Committee in hearings on the President's planning and State aid proposal in 1961. There was opposition to it from those who insist that State water rights are paramount to Federal rights—or should be. The situation did look hopeless, but the Interior Committee has persisted in an effort to reach agreement with the States on a mechanism for planning which will avoid the State-Federal rights issue. I appealed to Gov. Nelson Rockefeller, of New York, at one point in this effort to help end the impasse between Federal and States rights advocates which has existed since President Teddy Roosevelt's Inland Waterways Commission recommended comprehensive Federal planning in 1908.

A series of conferences between representatives of the Interstate Commission on Water Problems of the Council of State Governments and of our committee has ensued. Modifications of President Kennedy's proposal for basin planning commissions have been developed which I have reason to hope will find broader acceptance than any previous draft. There should consequently soon be before this Congress a revision of S. 2246 of the 87th Congress, intended to implement recommendations Nos. 1 and 2 of the Select Committee on National Water Resources and the President's proposal to get planning started.

We are not going to drop the effort to achieve orderly water resources planning. Wise management of the water resources of our planet is fully as important as exploring space. Both are going to be top priority concerns of mine in this Congress.

IMPLEMENTING THE RESEARCH RECOMMENDATION

The bill I have just introduced, the water resources research bill, is intended to contribute to the implementation of the select committee's third recommendation—a comprehensive Federal water research program.

So there will be no continuing misunderstanding of the bill, as is reflected in one departmental report on S. 3579, it should be clearly understood that the measure does not propose a total Federal water research effort and no such claim is made for it.

The bill proposes Federal financial assistance to land-grant colleges and universities or other competent higher educational institutions in each State, as the State determines, to establish a universitywide water resources research institute or center, in the general pattern of the Hatch Act of 1887 which authorized the agricultural experiment stations. Each State center will be entitled to \$100,000 annually on a continuing basis, plus matching funds for specific research or experimental projects. The Secretary of the Interior is also authorized to make grants, matching agreements and contracts with other colleges and universities, States and other governmental agencies, private foundations and other institutions, firms and individuals, to conduct water research projects within the scope of the Department of the Interior's mission in the water field. Appropriation of \$5 million in the first fiscal year, increasing to \$10 million over the next 5 years, would be authorized.

The program does not meet the need for expansion of direct Federal research work on important water problems like pollution control, weather modification and saline water conversion, nor the need for the departments of the Federal Government, other than Interior, to use the colleges and universities on research projects in their fields of responsibility. Just as the agricultural experiment stations supplement Federal agricultural research at Beltsville and many other direct Federal agricultural laboratories and research centers, the water research program proposed in this bill would supplement present programs of Federal agencies, not supplant them.

When I introduced the original draft of the bill, I said:

"The proposal is not a solution to all water resources research problems. It will make a great contribution both to the assurance of adequate water supplies and the advancement of our scientific knowledge but there will be a continuing necessity for special Federal water research programs such as the present saline water and pollution control work. There will be need for intensified fundamental scientific research into the nature of this element, and into every aspect of the hydrologic cycle, not only in the colleges and universities, but wherever competent scientists can be enlisted and supported in the work.

"This bill proposes what I believe will become a very important part of the sort of national water research program called for by the Senate Select Committee on National Water Resources in its 1961 report, but only one part of it."

STATEMENTS IN SUPPORT

Mr. ANDERSON. Mr. President, in my original remarks, I included statements from a number of eminent educators and scientists in regard to some of its major features.

They include the findings of a symposium of engineers that water research involves many fields of knowledge—mathematics, physics, chemistry, geology, meteorology, statistics, bacteriology, biology, geography, soil, science, agriculture, forest management, law, economics, public administration, political science, medicine and sociology. This listing supported the finding that water research must be interdisciplinary, with highly trained men available from a broad array of fields.

Dr. Joseph L. Fisher of Resources for the Future, and Dr. John C. Geyer of the Department of Sanitary Engineering and Water Resources at Johns Hopkins University are quoted on the need for more scientists—social as well as physical scientists—working in the water field. Together with Dr. Carl E. Kindsvater of the University of Georgia, they support the urgency and great value of combining research and education to bring about the training of much-needed scientists specializing in water problems.

The original endorsements of the basic objectives of this water resources research proposal could now be extensively supplemented from the reports of the executive agencies on S. 3579, from the findings of educational and scientific bodies who have independently made recommendations paralleling S. 3579 since its introduction, and from communications about the proposal from people with knowledge of our critical water situation.

I shall cite some of these supporting statements which are pertinent to features of the bill which have been, and will doubtless be debated further, during its consideration.

It has been suggested that regional, rather than State, water research centers would be adequate and that in some instances other than land-grant institutions should be designated as the home of the State water research agency.

The original bill provided that funds for a center should go to a land-grant college or university, or "such substantially equivalent arrangement as the State shall determine." That has been changed in the current draft to specify a land-grant institution or "other institution of higher education as the State shall determine." This is intended to make clearer that the State may designate whatever college or university it considers best to conduct interdisciplinary water research work. The new draft is further amended to authorize, but not require, two or more States to join in a single interstate or regional water research agency if they desire to do so.

MANPOWER REPORT

There should be such discretion in the bill, but I am prepared to defend, with the backing of some outstanding authorities, the wisdom of staying close to the pattern of the Hatch Act of 1887—the Agricultural Experiment Station Act—which authorized the establishment of experiment stations at the land-grant school in each State.

Report No. 1 of the President's Science Advisory Commission on "Meeting Manpower Needs in Science and Technology," declares:

"Additional first-rate educational opportunities should be located in such manner as to serve all geographic areas more effectively. Centers of excellence serving more regions and States would stimulate and spread economic progress because, as recent experience has shown, industry tends to concentrate around

leading institutions of science and technology. In addition to enlarging present programs, special arrangements will be required to assist areas of the country which now possess inadequate foundations for an effective graduate education program."

The President's Committee also found:

"Nowhere are the benefits of scientific research more dramatically revealed than in food production. Fifty years ago in this country an agricultural worker produced food for only 3 or 4 others in contrast to his capability to feed 27 individuals today.

"This accomplishment can be directly attributed to research that has been systematically supported by the Federal Government, the States, and private sources, in programs that have historically and effectively linked education and research. As a consequence, universities have been eminently able to meet changing needs."

WATER RESEARCH IN AGRICULTURAL PATTERN

The universities to which this comment alludes, are, of course, the land-grant institutions proposed to be activated in the water field by the bill I have introduced. The program of systematic Federal, State, and private support effectively linking education and research to which our great success in the food field is attributed is the exact pattern which would be established in the water resources field by the measure I have presented, for the language of the Water Resources Research Act is the language of the Hatch Act which started the agricultural experiment station system.

In the field of water research, the proposed act would spread centers of competence to serve the needs of the States on the same pattern which the President's Committee found the most outstanding example there is of the benefits of scientific research.

The Committee on Natural Resources of the National Academy of Sciences—National Research Council, in its study of the status of natural resources research for the President, has come to the conclusion that—

"In adapting their research programs and activities to the requirements of the problems outlined in this report, governmental and nongovernmental agencies and institutions should take full advantage of the resources of the universities, contracting out especially those studies for which the universities are uniquely equipped. It should be remembered that an important byproduct of the university research is the training that accompanies it, and the committee reemphasizes the need for training research workers to deal effectively with the problems relating to natural resources. These problems require closer cooperation between natural and social scientists."

WOULD ENLIST LAND GRANT SCHOOLS

The National Science Foundation group concluded that the Federal Government should "enlist the potentials of land-grant institutions" and that—

"These institutions should be encouraged to extend their interest to cover the total span of natural resources, particularly as they relate to the future well-being of the areas they serve. For example, these institutions in the coastal States could develop fisheries experiment stations similar to the agricultural experiment stations which have so successfully aided the development of agriculture in the United States.

"The faculties of these universities should be called upon to serve as advisers and assistants to local and State agencies with responsibilities for resource development, planning, and management."

It is appropriate to repeat at this point that one of the facts which stimulated the original concept of S. 3579 was the Interior Committee's finding, during a committee survey of current water research and study activities, that the States, in their efforts to meet pressing water problems, are already calling on land-grant college and university faculty members for help and advice.

As the cooperative Federal-State water resources planning work recommended by the Senate select committee, and by the President, gets underway—and there is going to be water planning because of the pressure of requirements whether Congress provides an orderly method or it has to be a patchwork job—State and local officials throughout the Nation are going to have increased need for such advice and assistance.

The conclusions of the National Academy study and of the President's Science Advisory Committee that we need more centers of competence, and that they

should be available to aid State and local needs, are sound and strongly support the soundness of assistance to each State to provide itself with the services of a water resources research center.

There are a great many water problems that are of interstate, regional, national, and even worldwide in character, such as saline water conversion and pollution. The soap companies sell detergents everywhere. The chemistry and the physical characteristics of the element itself are the same in New York and California, regardless of which is the bigger State. They are the same on all of the continents of the world, and much of the knowledge we gain through water research will have value in our international relationships.

PROBLEMS VARY WITH ENVIRONMENT

But water problems also vary with every difference in the environment in which the water occurs. Environment varies with the nature of human habitation and use in the area in which it occurs, with climate, with topography, elevation, vegetative cover, or lack of it, geology and scores of other factors.

There is fully as much variation in problems, and therefore justification and need for water resources research centers by States as there was and is for the agricultural experiment stations which have had such phenomenal success.

Another point of considerable discussion concerning this water research proposal has been the scarcity of hydroscintists. Fear has been expressed that the new State centers will enlist and draw scarce manpower away from useful water research work now in progress.

There are not going to be 50 research centers set up suddenly a week after this measure passes Congress and is signed. There must first be appropriations. The States must designate colleges and universities to establish centers, or institutes. The institutions designated will have to develop plans for competent and useful research having regard, under the terms of this revised bill, to the avoidance of any undue displacement of scientists and engineers elsewhere engaged in water resources research.

Development of the centers will come over a period of several years. It may not require 25 or 30 years, as in the case of agricultural experiment stations, but it would not all happen in 1 year. Department of Interior estimates, in its report on S. 3579, indicate that the programs will still be somewhat below maximum authorizations in the bill after 5 years.

Engineers hydrologists, and physical scientists will not be required for all of the projects undertaken, nor for all of the tasks of training needed personnel which are involved. Water problems are social as well as physical. There is a great deal we need to know about the economic value of water in alternative use, about the suitability and adequacy of our divergent systems of riparian and appropriation rights in water law, about the efficiency and effectiveness of the social and political institutions which administer water, the social and economic objectives of water resources development, the economic effects of interbasin transfers, the potentialities of flood plain zoning, methods of evaluating the use of water for recreation and scenic preservation, and a great many other matters outside the field of physical sciences. Many questions outside hydrology and engineering will arise in the process of planning river basins for optimum use, as we are committed to do.

MANPOWER POOL AVAILABLE

We are assured that there are a great many highly trained members of the faculties of colleges and universities, trained in both the social and scientific disciplines involved in water problems who, although not classified as hydroscintists, can be enlisted to specialize on work related to water and to conduct water related research, and direct and train students in such work. A great deal of effective and competent work can be accomplished in the period in which additional pure hydroscintists are being trained, which will also contribute to their training.

The University of New Mexico has just published a very valuable study of the comparative economic values of water in alternative uses directed by Dr. Nathaniel Wollman, an economist.

The study indicates that water from our San Juan-Chama project used for recreation will add four to five times as much to the State's gross product as water used in agriculture. Water used by industry will increase gross

State product 12 to 15 times more than use in recreation. A new mix of water uses is clearly in order.

Traditional social and economic concepts about water have been shaken not only in New Mexico, but in all water-short areas by the study. Things we have suspected have been factually demonstrated. A great deal of research, restudy, and replanning of water developments will need to be done to assure optimum use. There is need for research into our institutional arrangements for the transfer of water between uses. Standards and criteria for the justification of water projects must be reviewed. Repayment arrangements and pricing schedules will need restudy.

In its summary report on "Natural Resources Research" which was issued January 9, the National Science Foundation-National Research Council says in regard to water:

"Systems research directed toward simultaneous evaluation of combinations of alternative uses, operating procedures, and physical structures would greatly benefit all agencies having responsibility for regional and water basin developments. This research must utilize social as well as physical data and thus will require programs of supporting research in the social sciences as well as the physical sciences and engineering."

Any argument that we do not have adequate trained personnel to attack water problems competently and fruitfully in a very considerably expanded research program is necessarily based on a narrower concept of the nature of problems which need to be studied than the reality.

EXECUTIVE AGENCIES SUPPORT THE IDEA

Mr. President, the reports of the executive agencies have almost unanimously endorsed the basic objectives of S. 3579. Nearly all have made suggestions for amendments. Many of them have been incorporated in the draft I have just introduced. A few have not. All will be considered, of course, in committee hearings and executive sessions on the measure.

The major departmental reports have reached the committee since the new year so there has not been time to consider all suggestions for revision as carefully as will be done with more time.

The reports, and nongovernmental endorsements of the basic program proposed in S. 3579, are convincing that the measure deserves the attention and study of the Congress.

The Department of the Interior has "strongly recommended enactment of this legislation."

The Secretary of the Army has raised several questions in regard to S. 3579, which have been clarified in the new measure, but reports:

"The Department of the Army believes that an expansion of State research in the water field, supplementing and complementing the water research of the Federal agencies, would be desirable. Moreover, it is believed that an increase in the grants which the Federal Government now makes to the States to encourage research would be justified by the benefits which would accrue to the Nation as a whole. Hence the basic objective of S. 3579 has the full support of the Department of the Army, on behalf of the Department of Defense."

The Federal Power Commission asked that the measure be amended to assure that "other interested Federal agencies," as well as departments involved in water programs, are advised and consulted. After explaining the Commission's interest in hydroelectric power development and multiple-purpose planning of river basins, Chairman Joseph C. Swidler states:

"The Commission favors enactment of legislation that would accomplish the objectives of this bill."

The Tennessee Valley Authority, while raising the question of using regional instead of State research centers, reports: "We strongly subscribe to the bill's objective of encouraging research relating to the conservation, development and more effective use of our water resources. We believe that the proposal to make greater use of our colleges and universities in such a program is sound, not only as a means of acquiring needed technical assistance for research but also as a means of increasing the general interest of the colleges and universities in our water resources. We believe also that the problems in this field are so broad in scope and of such national importance that the Federal Government should provide direction and financial assistance in the efforts to solve them."

DR WIESNER'S COMMENT

In his report on S. 3579, Dr. Jerome Wiesner, the President's science adviser and Director of the Office of Science and Technology, prefaces his specific suggestions with this comment:

"Legislation along the general lines of the bill could serve a useful purpose in providing additional authority and funds for a concerted approach to the problems in the field of water resources research. To carry out the additional research in water resources needed to assure an abundance of water of adequate quality requires augmentation of research in the universities to more effectively utilize their research potential, to bring to bear the several interrelated disciplines bearing on water resources, and to train the new scientists and engineers sorely needed for research and teaching in this field.

"Some half dozen Federal departments and agencies have major responsibilities in water resources requiring research. They support research in their own laboratories and in the universities in accordance with their missions. The extent of such support is quite modest in relation to the needs for better understanding of the problems involved. Shortages of highly trained manpower would particularly limit the expansion of creative research in this field even if more funds were made available. There are many different kinds of research needed in water resources ranging from basic scientific research on the one hand, to applications engineering and economic analyses on the other. There is a special need for research and analysis that draws on the combined talents of scientists, engineers, social scientists, economists, lawyers and others. There is also a need at local levels for technical analyses and studies to apply the findings of research. The research problems may be national or highly local in character.

"As I perceive the broad objective of legislation along the lines of the bill, it should be aimed at supplementing existing agency arrangements for support of water resources research by fostering university-planned and initiated research and investigation that draws on the diverse scientific, technical and other skills throughout the schools and departments of the university or college; that is directed at State, regional or national water resources problems; and that is not shaped by the mission of a particular Federal agency providing financial support. Federal support of a program of this nature would need to be administered in the broad national interest and in the interests of all the Federal agencies having missions in water resources.

"I would hope that the flavor of the foregoing remarks could better be reflected in your bill so that there would be no misunderstanding as to its objective to supplement existing forms of support in certain important respects. On the other hand, by strengthening and expanding university- and college-wide capabilities for water resources research, additional research potential would be made available to all of the interesting Federal agencies."

The report of the Bureau of the Budget identifies that agency with Dr. Wiesner's report and specific suggestions made in subsequent portions of his letter.

Much of the suggested flavor, as well as most of the specific modifications, which Dr. Wiesner recommended, will be found in the new draft of the proposed legislation.

COORDINATION NOT IN S. 2

A point of concern emphasized by the Budget Bureau concerned coordination. Language in S. 3579 which directed the Secretary of the Interior to encourage a coordinated Federal water research program has been deleted. The word "encourage" was disregarded and the clause aroused the fears of some departments that Interior might be getting some surveillance over them. No such authority was intended. It is disclaimed in the new draft in a proviso so extensive and explicit it should end all fears.

The Executive Office of the President is working toward coordination of water resources research through the Office of Science and Technology. The Water Resources Planning Act, previously discussed, will provide coordination in the water planning field through the proposed Federal Water Resources Council, composed of the Secretaries of the Interior, Agriculture, Army, and Health, Education, and Welfare. Coordination of both planning and research is needed and can wisely be provided in the manners intended. It is neither attempted nor intended in this Water Resources Research Act.

Because administration of the proposed research program as a supplement to present work will require that the Department of the Interior know of re-

search projects in progress and planned throughout the Government, provision is made for the Department to be advised of research projects underway and planned by all of the Departments. Since it will have this information at hand if the measure is enacted, it is further directed to make up a file, or catalog, of all the Federal projects for public as well as departmental use.

This is a bookkeeping function—not coordination. It is needed. It took our committee months to gather together data on water resources projects underway within the Federal Government last year. It is already out of date. The bill I have proposed provides for the Department of the Interior to maintain a catalog of projects on an interim basis and authorizes the President to transfer it as he determines wise upon the establishment of a central catalog on scientific research, or an overall program for keeping such information available.

It has been gratifying that a number of major groups concerned with our water resources have endorsed S. 3579 directly, or in terms of its objectives.

The Association of State Universities and Land-Grant Colleges adopted two resolutions in respect to S. 3579, one originating in its committee on water resources. The second was offered by its engineering division.

Mr. President, I ask unanimous consent to include in my remarks at this point the two resolutions approved by the association at its convention here November 12 and 13.

The VICE PRESIDENT. Without objection, it is so ordered.

The resolutions are as follows:

"REPORT FROM THE COMMITTEE ON WATER RESOURCES OF THE ASSOCIATION OF STATE UNIVERSITIES AND LAND-GRANT COLLEGES

"The water resources committee also considered the proposed legislation known as the Anderson bill, S. 3579. The committee endorses S. 3579, as recognizing problems of extreme national concern. For many years, the land-grant institutions through their research and education capabilities have been working on these problems. However, the Anderson bill provides the mechanism for them to take a concerted national action through—

"(a) Providing for the establishment of university wide water resource research institutes or the equivalent.

"(b) Providing continuing financial support for research on the water resources problem.

"The water resources committee believes that the Anderson bill is to be commended particularly for its forward-looking proposals in five areas:

"(1) It identifies the need for basic research and a focus of multidiscipline capabilities on the water resources problem.

"(2) It recognizes the need for local and regional centers of interest and activity on water resources problems.

"(3) It provides a mechanism for increasing the supply of highly educated manpower capable of dealing with water resources problems.

"(4) It provides for a realistic combination of funds for continuing research programs with funds for grants and contracts on a short-term, special-project basis.

"(5) It creates a channel that does not now exist through which a Federal Government agency and the educational institutions of America can mutually advance the national interests in a key resources area.

"The water resources committee suggests that, if practical, the language of the bill should be amended to give consideration to the following suggestions:

"(a) That matching of Federal funds by the States under section 100(b) be on a dollar-for-dollar basis.

"(b) That for clarity, section 106 be placed under title III.

"(c) That provision for continuation of title II funds beyond 1969 be included.

"(d) That the Service should use consultants and advisory boards to the fullest extent practical in identifying the research problems of most importance to be financed by title II funds.

"Approved, water resources committee, November 11, 1962.

W. E. MORGAN,
Chairman.

"Approved by the Senate of the Association of State Universities and Land-Grant Colleges, November 13, 1962."

"RESOLUTION FROM THE ENGINEERING DIVISION, ASSOCIATION OF STATE
UNIVERSITIES AND LAND-GRANT COLLEGES"

"The Engineering Division of the Association of State Universities and Land-Grant Colleges heartily endorses S. 3579, the Anderson bill, and supports its enactment. The bill is commended for its proposals to establish State water resources research institutes, to provide funds for both continuing research programs and project research, and to establish a Water Resources Service in the Department of the Interior. The division believes that engineering research and education have much to offer to this proposed coordinated effort to focus the strength of educational institutions on the water resource problem. The member schools of engineering of the division look forward to participating in the proposed university-wide efforts. The division believes that passage of the Anderson bill will open up a much-needed channel for cross-fertilization between programs of the Department of the Interior and those of educational institutions. Copies of this resolution are to be sent to Senator Anderson, the Department of the Interior and the Office of Science and Technology.

"Approved, engineering division, November 12, 1962.

"J. D. RYDER,
"Secretary.

"Approved by the Senate of the Association of State Universities and Land-Grant Colleges, November 14, 1962."

Mr. ANDERSON. Mr. President, I ask unanimous consent also to include at this point in my remarks a resolution adopted by the Interstate Conference on Water Problems of the Council of State Governments at its annual meeting in Chicago on December 5, 1962.

The VICE PRESIDENT. Without objection, it is so ordered.

The resolution is as follows:

"RESOLUTION ADOPTED BY THE INTERSTATE CONFERENCE ON WATER PROBLEMS OF THE
COUNCIL OF STATE GOVERNMENTS REGARDING WATER RESOURCES RESEARCH"

"Whereas the constantly increasing demand upon the Nation's water resources necessitates an immediate and pronounced acceleration of water resources research; and

"Whereas the States have a responsibility to aid in the solution of problems requiring research; and

"Whereas there was introduced in the 87th Congress legislation which could be helpful in promoting such research and in assisting the States in discharging their responsibilities: Now, therefore, be it

"Resolved by the Interstate Conference on Water Problems meeting in Chicago, December 5, 1962, That the States are urged to increase their support of coordinated programs of water resources research; and be it further

"Resolved, That the Congress is urged to give favorable consideration to legislation providing for distribution of sums for research in furtherance of programs developed by a qualified college or university in each State and Puerto Rico, or such other substantially equivalent arrangement as the State may determine, such distribution to be made only after consultation with the Governor or appropriate State agency as the Governor may direct and for programs of coordinated research or for programs which are compatible with coordinated research programs.

"Adopted, Chicago, Ill., December 5, 1962."

Mr. ANDERSON. Mr. President, I have today received a letter from the American Society of Civil Engineers saying that the "society believes that enactment of legislation along the general lines of this bill (S. 3579) would advance its aims in the field of water related research."

Mr. President, I ask unanimous consent to include the society's letter, signed by Mr. William H. Wisely, in the Record.

The VICE PRESIDENT. Without objection, it is so ordered.

The letter is as follows:

AMERICAN SOCIETY OF CIVIL ENGINEERS,
January 10, 1963.

Hon. CLINTON P. ANDERSON,
Chairman, Committee on Interior and Insular Affairs,
U.S. Senate, Washington, D.C.

DEAR SENATOR ANDERSON: The American Society of Civil Engineers has a continuing interest in all aspects of national water policy. On the basis of its study

of all aspects of water problems, the society is convinced of the need for an increase in research in civil engineering fields related to water resources.

It is the thoughtfully considered viewpoint of this society that support should be given to the general principle of Federal-State participation in such research. Furthermore, it is essential that provision be made for better coordination of research and educational approaches to the development of water resources.

In recent months, note has been taken of the prospect of establishment of water resource institutes at each land-grant college, through the enactment of S. 3579 of the 87th Congress. The society believes that enactment of legislation along the general lines of this bill would advance its aims in the field of water-related research.

It is hoped that there will be an appropriate time and place for full discussion of future policies for water resources research. At such time, well-qualified and informed officers and members of this society would welcome the opportunity to elaborate upon this brief statement.

Cordially,

WILLIAM H. WISELY,
Executive Secretary.

MR. ANDERSON. Mr. President, I ask unanimous consent that a resolution adopted by the Policy and Coordinating Committee on Water Resources of the University of Idaho may be printed in the Record.

THE VICE PRESIDENT. Without objection, it is so ordered.

The resolution is as follows :

"RESOLUTION ON S. 3579 BY THE POLICY AND COORDINATING COMMITTEE ON WATER RESOURCES OF THE UNIVERSITY OF IDAHO

"Whereas Senate bill 3579 which is better known as the Water Resources Research Act submitted by Senator Anderson, of New Mexico, is now before the Congress ; and

"Whereas this bill is designed to establish a water resources research institute at the various State universities to promote a more adequate national program of water research and to train competent personnel in fields related to water resources ; and

"Whereas the University of Idaho through its policy and coordinating committee on water resources is dedicated to assisting in formulation of coordinated research and planning for the development of the water resources of the State of Idaho and is interested in a coordinated water resources policy and program for the Nation ; and

"Whereas the University of Idaho recognizes that the manner in which we utilize and develop water resources will influence our health, security, economy and well-being for all time, and as such, support from this act would help to meet the needs of the University of Idaho and the Nation as a whole ; and

"Whereas it is the considered judgment of the policy and coordinating committee on water resources and its advisory committee, as listed below, that the bill is in the best interest of the University of Idaho, the State of Idaho, and the Nation that the proposed legislation be enacted : Now, therefore, be it

"Resolved, That the congressional delegates from the State of Idaho and the Governor of the State of Idaho use their good offices to lend their support and endeavor to obtain the adoption of the Water Resources Research Act, Senate bill 3579."

SENATOR ANDERSON. I would like to call attention also to the speech made on the Senate floor by the able Senator from Nebraska, Mr. Hruska. It is a very, very fine statement. If there is no objection I would like to include that very fine statement in the record at this point. Senator Hruska may still come and testify, but this is as good testimony as a man could give. It is a very fine statement by him.

(The matter referred to is as follows:)

ESTABLISHMENT OF WATER RESOURCES RESEARCH CENTERS

MR. HRUSKA. Mr. President, the senior Senator from New Mexico [Mr. Anderson] introduced earlier in this session S. 2, a bill to establish water resources research institutes or centers at land-grant colleges and universities, to stim-

ulate water resources research at other institutions of higher education, and to promote a more adequate national program in this field.

The Senator from Nebraska gladly responded to the invitation to cosponsor this bill. It is a desirable and urgently needed measure. It should be accorded early hearings and prompt enactment. I shall do what I can to support and advance it.

PROVISIONS OF BILL IN GENERAL

S. 2 proposes Federal financial assistance to land-grant colleges and universities or other competent institutions of higher education in each State, as the State determines, to establish a universitywide water resources research institute or center, in the general pattern of the Hatch Act of 1887 which authorized the agricultural experiment stations. Each State center will be entitled to as much as \$100,000 annually on a continuing basis, plus matching funds for specific research or experimental projects. The Secretary of the Interior is also authorized to make grants, matching agreements and contracts with other colleges and universities. States and other governmental agencies, private foundations and other institutions, firms and individuals, to conduct water research projects within the scope of the Department of Interior's mission in the water field. An appropriation of \$5 million in the first fiscal year, increasing to \$10 million over the next 5 years, would be authorized.

The purpose of the bill is to implement recommendation No. 3 of the Senate Select Committee on National Water Resources. Specifically this select committee recommended that a coordinated research program on water be undertaken to include both research into ways to increase available supplies and ways to increase efficiency in the use of water required to produce manufactured goods and crops. In greater detail, the committee recommended that existing programs be strengthened by taking the following action—page 18 select committee's Report No. 29, 87th Congress, 1st session:

“(a) Expanding the programs of basic research dealing with atmospheric physics, solar activity, hydrology of groundwater movement and recharge, the physical chemistry and molecular structure of water, photosynthesis, climatic cycles, and other natural phenomena associated with water in all its forms. Such research is essential to a major breakthrough in such fields as short- and long-range weather forecasting, weather modifications, efficient management of underground reservoirs, evaporation reduction, desalinization, and pollution abatement, as well as to major improvements in works for the storage and control of water.

“(b) Providing for a more balanced and better constructed program of applied research for increasing water supplies through desalinization, weather modification, and evaporation and evapotranspiration reduction.

“(c) Providing for an expanded program of applied research for water conservation. Special emphasis should be given to research on improved waste treatment methods, on ways of increasing efficiency in the agricultural use of water, on fish and wildlife needs, and on methods of system planning for the optimum development of water resources of river basins.

“(d) Evaluating completed projects with a view to determining modifications to enable them more effectively to meet changing needs, to provide better guidelines for future projects, and to better determine their effect on the local, regional, and national economy.”

The committee made four other recommendations. They will be discussed later.

NEED FOR ACTION

The future water needs of the Nation were thoroughly inquired into, studied, and reported by the Senate Select Committee on National Water Resources organized in 1959. Extensive hearings were held. A report was made to the Senate in January 1961—Report No. 29, 87th Congress, 1st session.

The findings of the committee show how rapidly America is approaching the point at which shortages of available water supplies will constitute a significant barrier to our economic and social progress. It identified major portions of the United States, equal to more than one-fourth of the land area of the mainland States except Alaska, which by 1980 will have very little water to meet the requirements of expanding industry and a growing population. The committee further found that by the year 2000 this condition of water scarcity would extend to an area comprising virtually one-half of the land

area of the 48 contiguous States. Maintenance of water quality will be a critical problem everywhere in the United States. Indications of this appear in our newspapers almost daily.

The demands on the Nation's water resources have increased tremendously in recent years. The present 300 billion gallons of daily withdrawal will double by 1980. These demands will triple by the year 2000. These computations are based on medium projections of population increase and on assumptions which include such factors as, first, that there will be continued growth of the Nation's economy at the same rate as in the past; second, that adequate water supplies will be made available under the present general pricing policies; third, that there will be relatively little change in presently known technical methods of water use; and fourth, that with the exception of increase application of techniques for improving the efficiency of irrigation, present methods of using water will continue.

In the course of the testimony on "Supply of and Demand for Water in the United States as Estimated for 1980 and 2000"—see page 123 of report—there is found an outlined and summary of three potential programs for meeting water demands. Each is designed for meeting demands under different assumptions, but all are for assumed medium levels of population and economic growth; a maximum storage-minimum treatment program; a minimum storage-maximum treatment program; and a minimum cost program which would provide for meeting needs at the least cost.

Capital costs of these three programs range from \$54.2 to \$74.3 billion by 1980. The range by the year 2000 is from \$99.6 to \$118.3 billion.

The report then makes this very challenging statement:

"Regardless of which of the programs is adopted, five regions, the upper Missouri, upper Rio Grande and Pecos, Colorado, Great Basin and South Pacific, will be short of water under the assumptions made, and will require maximum regulation by 1980."

Mr. President, this brings the problem very close to home for all people of my State because "upper Missouri River region" contains the entire State of Nebraska, among other neighboring States. In fact, Nebraska is the only State which lies entirely within the boundaries of the Missouri River Basin.

In other words, the States in the five water regions referred to will be required to develop fully all available water resources by 1980 or earlier if the projected increase in population is experienced and economic activity is to be achieved.

The year 1980 is only 17 years away.

The foregoing information is just an indication of the startling statistics and other disclosures contained in the select committee series of 32 committee prints issuing its studies. They cause thoughtful individuals to pause; to wonder at the benefactions of nature which has so generously provided for our wants until now; and to consider seriously the methods we must adopt and means we must provide in order to conserve, develop, and wisely use water upon which all human endeavor so heavily depends.

Later in my remarks, I shall discuss the Nebraska situation in greater particular.

WHAT CAN BE DONE

The select committee made five principal recommendations, each of which is supported by voluminous material. Briefly stated, these recommendations are:

First. The Federal Government, in cooperation with the States, should prepare and keep up to date plans for comprehensive water development and management for all major river basins of the United States.

Second. The Federal Government should stimulate more active participation by the States in planning and undertaking water development and management activities by setting up a 10-year program of grants to the States for water resources planning.

Third. The Federal Government should undertake a coordinated scientific research program on water.

Fourth. The Federal Government should prepare biennially an assessment of the water supply demand outlook for each of the water resources regions of the United States.

Fifth. The Federal Government in cooperation with the States should take steps to encourage efficiency in water development and use.

The recommendations are based on the committee's belief that future water demands can be met best by a proper combination of the following efforts: (a) construction program; (b) scientific research; (c) development of known tech-

nical methods; and (d) strengthening of government policies affecting water development and use. However, the Select Committee Report wisely observes:

"Such a combination of efforts cannot be achieved overnight, and will require the combined efforts of the legislative and executive branches of the Federal Government, as well as a continuation and strengthening of work in these fields by State and local governments and private enterprise."

FEDERAL LEGISLATION TO ACHIEVE RECOMMENDATIONS

However desirable and well considered any recommendation may be, a proposal to implement it legislatively must also be politically acceptable.

This became very clear two summers ago when the Senate Interior and Insular Affairs Committee sat with the Senate Public Works Committee in hearings on S. 2246, the President's water resources planning bill. This measure was designed to implement the select committee's recommendations 1 and 2 by providing machinery for development of major river basin plans by 1970 and to provide the recommended aid to the States for participation in planning work.

It encountered stern resistance from those who vigorously contend that State water rights are paramount to Federal rights in that field; that they have been for a long time as a matter of national policy; and that they should remain so. This position has been asserted often in the past 50 years since there was first boldly proposed a comprehensive Federal planning program. The concept of national planning was directly opposed to the position maintained for a century and a half and more that the citizens of the individual States have had the powers and responsibilities for the control, use, and development of the water resources within their State boundaries in accordance with local needs and conditions. At any rate, the result of this fundamental, sharp, and irreconcilable conflict of philosophies with regard to the President's bill in the 87th Congress was a complete stalemate.

Since that time, determined effort has been made to agree upon and develop a common ground which opponents on this point can occupy. Senator Anderson optimistically noted that some progress has been made, and that the President's proposal to implement legislatively the select committee's recommendations 1 and 2 is being so modified as to prompt him to hope that there will be broader acceptance of the modified 1963 version than there was of the 1961 bill.

Parenthetically, the Senator from Nebraska joins in the hope that sufficiently common ground can be found. I am in full agreement with the statement that there will be water planning the Nation over, because of the growing pressures for water. Planning of some kind will be undertaken whether Congress provides an orderly method or not. It behooves every interested person to exert utmost good faith and diligence to the end that a workable and acceptable method be found as expeditiously as possible.

However, not any price can be paid for such a result. As important as the objectives of the 1963 administration bill for recommendations 1 and 2 are, the fact remains that they are not the sole considerations. The convictions held by so many that citizens of individual States have recognized powers and responsibilities as to control, use, and development of water are deeply held as being vital to continued survival of social and economic progress over the Nation. This is especially true in the semiarid States. The idea of surrendering long-held State preferences in this field leaves them very cold indeed. They will not compromise unduly; nor will they capitulate easily. And they should not.

PHILOSOPHIC BASIS OF S. 2

One direct result of the State-Federal conflict over water supremacy encountered in the last Congress is that S. 2 resorts to the time honored and very successful Hatch Act concept. This approach avoids the bitter struggle and probably hopeless strife as to paramount water rights.

The Hatch Act, originally enacted in 1887—a revision and codification was enacted in 1955—created an agricultural experiment station system at the land-grant colleges and States universities. The pattern of State-Federal cooperation established some 75 years ago has been very successful.

Under the Hatch Act splendid teaching and scientific talent has been made available for the study and teaching of basic scientific endeavors, as well as coping with practical problems of agriculture. Education and research have been combined. Highly trained personnel serve State and individual needs for new and useful information. How well this concept has worked is widely known.

American agricultural production and experimentation are the wonders and envies of the world.

Because of its general acceptance, the Hatch Act concept was applied in the drafting of S. 2.

Senator Anderson frankly and proudly states that S. 2 is "an effort to copy and expand the agricultural experiment station system and the pattern on which it was built." In his remarks on introducing S. 2, he pointed out that the bill proposes Federal financial assistance to land-grant colleges and universities or other competent higher educational institutions in each State, as the State determines, to establish a university-wide water resources research institute or center in the general pattern of the act authorizing the agricultural experiment station. He specifically pointed out—page 186, Congressional Record for January 14, 1963:

"The program does not meet the need for expansion of direct Federal research work on important water problems like pollution control, weather modification and saline water conversion, nor the need for the Departments of the Federal Government, other than Interior, to use the colleges and universities on research projects in their fields of responsibility. Just as the agricultural experiment stations supplement Federal agricultural research at Beltsville and many other direct Federal agricultural laboratories and research centers, the water research program proposed in this bill would supplement present programs of Federal agencies, not supplant them."

The Senator from Nebraska fully concurs with these declarations.

COST OF PROGRAM

Cost of the program will be of deep concern and great interest to all, and properly so.

Question 1. Can we at this juncture of high taxes and Government spending and the highest Federal Government deficits afford to embark on a research program which authorizes expenditure of approximately \$50 million in the next 5 years for this limited water development program?

Question 2. Can the Nation afford a program which the select committee estimates at a gross of some \$54 billion to the year 1980 for storage, waste collection, and treatment over all levels of Government?

These sums are astronomical. Perhaps they can be scaled down. But if we extended the period by 10 years to 1990 and would reduce the expenditures by \$10 billion, they still sound pretty much out in the realm of the stars.

In an effort to answer these questions, let us reconsider the report of the select committee:

"Regardless of which of the (three potential) programs is adopted, five regions, the Upper Missouri, Upper Rio Grande and Pecos, Colorado, Great Basin, and South Pacific, will be short of water under the assumptions made, and will require maximum regulation by 1980 (p. 124)."

Mr. President, this is the answer to questions 1 and 2. In the light of the quotation from the report, we can readily paraphrase both of the questions as follows: "Can the economy of the United States continue to grow and prosper—or even to exist—with inadequate supplies of water for our population, our agriculture, and our industry?"

To ask the question is to answer it.

NEEDS WILL BE SUPPLIED

In one way or another, these water needs will be supplied. They must be. As an intelligent, energetic people with some eye to the future, we should go about it sensibly—not haphazardly or tardily. S. 2 is a sound first step. Solidly worked out in concept and in operational methods, the bill will be successful if we give it a chance. It will implement recommendation 3 of the select committee report relating to research.

Mr. President, as for recommendations 1 and 2, the Senator from Nebraska would rather await the introduction of a bill stating in precise and specific language what will be undertaken before making comment. It is my earnest hope that the measure in process of preparation will be sufficiently possessed of "broader acceptance" than the 1961 version. If it does not, it will be opposed. It should be.

Meantime, the task at hand as to S. 2 is one upon which we will find wide agreement. We should proceed in advancing it with such dispatch as we can command.

NEBRASKA'S INTEREST

My home State has been conscious of and highly concerned with water from the time it entered the Union. As a reclamation State, this is understandable.

Our longtime, keen interest, and participation in the Pick-Sloan plan typifies the interest expressed in water resources. All of the State's eastern boundary and a part of its northern line are formed by the Missouri River.

It is with gratification that we witness the substantial completion of the main-stem system of reservoir projects. After years of study, planning, and construction, the vision of farsighted men is materializing in the 90-percent completion of reservoir construction. Eighty percent of ultimate water storage is now available, and 60 percent of the ultimate power capacity is now on the line. Over and above these advantages we have the very vital assurance of water for navigation, industrial, and domestic purposes, fish and wildlife, and recreation.

In this connection we are aware of two factors: First, all of these attainments were pursuant to a plan conceived and authorized by law nearly 20 years ago. Many changes have occurred since then in technology and objectives. Second, the main-stem development is only a part of the development of water resources. There remain the vast demands of geographical and population areas away from the Missouri River main stem for available supplies of water. Likewise, short-term as well as long-term needs must be provided for and planned.

Many water storage and supply structures and works have been completed within our State. Others are under construction, while still others are in the planning or study stages.

We have reached, and maybe gone well into the stage where specific water problems claim immediate attention. In approaching them it would be extremely helpful to have the advantage of scientific studies made by our university addressed to our specific needs, in addition to the general value such analysis would have.

This is particularly apparent when we consider the legislation pending before the current session of the Nebraska State Legislature.

ADVANTAGES TO NEBRASKA

The advantages in having these studies prepared can also be seen by considering the following general propositions:

First, there are several irrigation projects either under construction or in planning in the Lower Loup Valley. It is important to know their ultimate effect upon the streamflow in lower river reaches after these projects are completed.

Second, the effect these and other projects will have on domestic water supplies and their priority under the constitution.

Third, comprehensive studies should be conducted on the subject of the supply of underground water in Nebraska.

We are disposed to think that it is an inexhaustible supply and earnestly hope it will always prove to be. But if future studies will show some indication in years ahead of depletion, it is essential to have technical advice on what system of appropriation to apply to prevent overpumping and what system of priorities to apply with reference to the various 24,000 wells now in existence. In this connection it would be important to know whether these priorities should be on a statewide basis or on a river valley basis and where the boundaries of such valleys are if that will be the area unit.

Hand in hand with this will be discovery and early adoption on a wide basis of more efficient uses and storage practices of this precious natural resource.

All of these and many other subjects of inquiry will fall within the purview of recommendation No. 3 of the report on national water resources, as implemented by S. 2.

All of these subjects will be embraced within the activities of the basic research, studying ways to increase available supplies and methods to increase the efficiency in the use of water required to produce manufactured goods and crops.

Hence, it is readily seen that for the State of Nebraska, in common with all of the reclamation States, and indeed all the States without regard to their geographic location, S. 2 is of highest importance.

It is to be hoped that all of these approaches will be thoroughly canvassed so that the best possible legislation for the purpose at hand can be achieved by this bill.

Senator ANDERSON. May I read from this Agricultural Research Act of 1946.

It says:

The Secretary of Agriculture, in accordance with such regulations as he deems necessary, and when in his judgment the work will be carried out more effectively, more rapidly, or at less cost than if performed by the Department of Agriculture, may enter into contracts with such public or private organization or individuals as he may find qualified to carry on work under this section without regard to the provisions of section 1, title 41.

In other words, we recognize that there is research work that might be best done by a private organization. We found that the Du Pont Co.—I don't want to give them any free publicity—had a very wonderful compilation of agricultural research programs that they knew about in the country, and we thought it might be useful maybe to use their private facilities. And then at the tail end of this section:

Such research shall in addition to research provide for under other law, but both activities shall be coordinated so far as practical, and shall be conducted by such agencies of the Department of Agriculture as the Secretary of Agriculture may designate or establish.

It is designed to be in addition to the regular things now going on. Personally, I am happy that the Department of Agriculture has brought this point out, because it now will be in the record sufficiently clear, I think, so there can be no question about the administration.

Are there questions?

Thank you very much for coming.

Mr. SMITH. Without being facetious, it has been said that one of the appealing features is that if we allow our State colleges stations to have this program we will soon have enough water surpluses to match our grain supplies in storage.

Senator ANDERSON. We are going to have to work hard, because I noticed in a grain publication I was reading last week that they thought they were going to be able to develop a hybrid variety of wheat, similar to hybrid corn, which could give regular production running 150 bushels to the acre. When I left the Department of Agriculture I think the average production was 17.9 bushels per acre. Down in New Mexico I got 50 bushels per acre on one irrigated plot, and thought that was extremely fine. Imagine what would happen to the wheat situation in America if you produced that much wheat per acre—150 bushels! Then men would certainly be able to spare an acre for recreation, and maybe even a little for wilderness.

Mr. Penfold.

STATEMENT OF JOSEPH PENFOLD, IZAAK WALTON LEAGUE OF THE U.S.A.

Mr. PENFOLD. Thank you, Mr. Chairman.

I am Joseph Penfold, director of the Izaak Walton League.

After starting this morning I had a phone call from Mr. Philip A. Douglas, executive secretary of the Sport Fishing Institute, who could not be here today, and he asked that I express for him the wholehearted support of his organization for this legislation.

The Izaak Walton League of American appreciates the privilege of appearing in behalf of Senate bill No. 2. The league has had a longtime concern with this subject, not only because the complex problems of water supply and its allocation are of paramount importance to fish and wildlife, but also because all the things we do, and everyone

else does, working, recreating or whatever, in the last analysis depends upon water, in ample supply, and of usable quality.

This legislation has a broad purpose: To stimulate, sponsor and provide for research, investigations and experiments in the field of water and related resources as they affect water, supplementing present programs and to encourage the training of scientists in the field by assistance to colleges and universities in the development of water resources research programs. The purpose beyond this is to assure an abundance of water both in quantity and quality that will be necessary to meet all of our increasing requirements. These purposes are strongly endorsed by the Izaak Walton League. It would seem to us that the water resources research recommendation of the Senate select committee, in the long run will prove to be the most important of its recommendations.

Mr. Chairman, we can claim no special competence in determining the ways and means where by maximum results may accrue from Federal research dollars. Nonetheless, the proposal to encourage the land-grant colleges, or other university specified by each State, to establish a water resources research institute on a permanent basis would appear an essential first step. Clearly our fundamental problems in water resources will not be solved until the public itself is understanding of them and prepared to act responsibly in the decisions and choices which the public alone can make. The nationwide character of the research base which title I of the legislation would establish will prove most important, we believe.

To digress a moment, Mr. Chairman, I am delighted that Professor Morgan, of Colorado State University, is here to testify in support of this legislation. Having had two sons and two daughters-in-law graduate from his university, I have a very strong bias for the competence of that university to follow through very quickly on this program with his approval.

Senator ANDERSON. You are entitled to have that prejudice.

Mr. PENFOLD. Thank you.

An equally important element of this proposal is that the water resources institute be universitywide, that it cut across all the disciplines, not only the physical sciences but the social sciences as well. To make an analogy, it may well be that our engineers can place a spaceship on the farthest planet, and bring it back, long before they have found how to provide an environment for the astronauts that will permit them to make the trip. Similarly, the engineers can undoubtedly find far more efficient ways to intercept, conserve, store, channel, and distribute water supplies, without contributing anything meaningful to man's environment. They might indeed detract from it.

The authors of this legislation, we are sure, had the broader concept in mind in specifying the universitywide base. Certainly, Senator Anderson when introducing the bill gave important emphasis to it. In this connection Mr. Chairman, we note in those same remarks that—

The program does not meet the need for expansion of direct Federal research work on important water problems like pollution control, weather modification and saline water conversion * * *

And down that same paragraph—

the water research program proposed in this bill would supplement present programs of Federal agencies, not supplant them.

We mention this because waters which are now too polluted to use, once cleaned up, may very well offer our greatest opportunity to expand total usable water supplies. This should be a particularly productive area of research for each State institute, because the problem ties directly to the industries and agriculture of the particular State as well as to all the other water needs of the people of that State.

In conclusion, Mr. Chairman, we would like to emphasize another point which Senator Anderson made very well in introducing the bill. He said that as a result of a University of New Mexico water economics study that "traditional social and economic concepts about water have been shaken not only in New Mexico, but in all water-short areas." I am sure this is true. I am sure we will be shaken still more, as research brings us a whole new body of facts which will enable us to understand more clearly and precisely what our real needs are and what we must do to meet them.

It seems to us that the Federal-State approach, with universities the core of the effort, as provided in S. 2, makes the best kind of sense.

We appreciate this privilege to offer our comments.

Senator ANDERSON. Thank you.

Are there any questions?

(No response.)

Senator ANDERSON. William E. Welsh, secretary-manager of the National Reclamation Association, is our next witness.

Mr. Welsh.

STATEMENT OF WILLIAM E. WELSH, SECRETARY-MANAGER, NATIONAL RECLAMATION ASSOCIATION

Mr. WELSH. The purpose of this bill by Senator Anderson and others is to establish water resources research centers at land-grant colleges and State universities to stimulate water research at other colleges, universities, and centers of competence and to promote a more adequate national program of water research.

Our association has long been actively interested in this type of research. We have had a special committee working with the problem of soil and water research for more than a decade. We believe that a great deal has been accomplished through the efforts of our National Reclamation Association committee. The first report of our special committee, through the assistance and cooperation of Senator Carl Hayden, Arizona, was published in January 1952 as Senate Document 98. This document was given widespread distribution throughout the entire country. Another very worthy document was Senate Document 59, published in September 1959, also through the efforts of Senator Hayden. Our National Reclamation Association committee purchased a large number of these documents and had them given nationwide distribution.

In June 1961, the National Reclamation Association joined with the National Association of Soil Conservation Districts in sponsoring a national water research symposium. This symposium was held March 28-30 of that year in Washington, D.C. Speakers at this symposium included men of known ability who had given a great deal of time and attention to the problems of water research. This symposium assisted materially in bringing to the attention of Mem-

bers of the Congress, as well as people over the Nation as a whole generally, the necessity of accelerating our water research program.

The National Water Research Symposium program, including the full text of the many excellent addresses delivered, was published as Senate Document 35 in June 1961.

As further evidence of the interest of our members in the important subject of water resources research, I refer you to Resolution 18 adopted at the 31st annual meeting of our association which was held in Portland, Oreg., last October. This resolution is entitled "Basic Water Research." A copy of this resolution is attached to my statement and I request that it be inserted in the record along with my statement.

(The resolution is as follows:)

RESOLUTION 18—BASIC WATER RESEARCH

Whereas the constantly increasing demand upon the Nation's water resources, together with the impairment of water quality incident to many uses, necessitates an immediate and pronounced acceleration of basic research toward securing the preservation and improvement of water quality for necessary successive uses; and

Whereas there is urgent and immediate need for such research activity and for avoidance of duplication of effort and diffusion of responsibility: Now, therefore, be it

Resolved, That the National Reclamation Association urges (1) the adoption of high priority of adequate financing and activity in the field of basic soil and water research, including adequate funds for expenditure by existing Federal agencies, the State universities, and the land-grant colleges to establish and carry through an effective, fully coordinated, basic soil and water research program; (2) the request for and immediate appropriation of adequate funds to implement the findings of Senate Document No. 59, 86th Congress, 1st session.

Mr. WELSH. In many areas of the West and particularly in the Southwest, the possibility of water shortage looms on the horizon as a serious threat to the continued future growth and development of that area. Research, such as proposed by S. 2, will be a very important and vital factor—in fact, a very necessary factor—if we are to meet the water requirements of the rapidly increasing population of the West and particularly the Southwest.

We strongly endorse S. 2 and express our appreciation to Senator Anderson and the other Members of the Senate who have joined him in sponsoring this important legislation.

We appreciate the opportunity of presenting this statement on behalf of the entire membership of the National Reclamation Association.

Senator ANDERSON. Senator Gale McGee, of Wyoming, wants to make a statement on the bill. We are delighted to have Senator McGee, who was a member of the Senate Select Committee on Water Resources.

STATEMENT OF HON. GALE MCGEE, A U.S. SENATOR FROM THE STATE OF WYOMING

Senator MCGEE. Mr. Chairman, as a cosponsor of S. 2, a bill to establish water resources research centers at land-grant colleges and State universities, and to promote a more adequate national program of water research, I am very happy to support this bill and urge the committee to report it to the Senate for early consideration.

I feel it was a great privilege to serve on the Senate Select Committee on National Water Problems because of the focus which was placed upon this most precious of our natural resources. The reports which we on the committee prepared have served as a guideline for future action, including the preparation and introduction of this bill.

On October 8, 1959, the committee conducted a hearing in Laramie, Wyo., at my invitation to develop a record on Wyoming's water resources. During the course of that hearing it was pretty well developed that Wyoming has sufficient water resources if they are properly utilized. The concept of using the trained personnel of the land-grant colleges to do water research is a wise one indeed. At the University of Wyoming we have a well-trained staff of people who fully understand the problems peculiar to Wyoming and by utilizing their services considerable amounts of money can be saved. Undoubtedly, this is true throughout the other Western States.

By starting the program at a scale of \$75,000 for each State to be scaled upward after a period of 3 years to an amount of \$100,000 is also a wise course to follow in my judgment. These amounts will afford the technicians an opportunity to develop workable plans and follow a course of action which will be most beneficial to the State and Nation.

I am also pleased with the provision which requires the funds allocated under this act must be used for new projects, and cannot be used to relieve the States or their subdivisions of financial responsibilities which they may now have.

In the final instance, there are sufficient safeguards in the bill to prevent Federal domination of the research work, but the results of the studies will be available for all interested agencies to gain the benefits derived therefrom.

I enthusiastically support this proposal and hope it may be enacted into law.

Senator ANDERSON. I have a letter and resolution from the Texas Water Conservation Association endorsing S. 2, and without objection it will be included in the record.

(The letter and resolution are as follows:)

TEXAS WATER CONSERVATION ASSOCIATION,
Austin Tex., February 18, 1963.

Senator CLINTON P. ANDERSON,
Senate Office Building, Washington, D.C.

MY DEAR SENATOR: At its 18th annual meeting held in San Angelo, Tex., October 7-8, 1962, the Texas Water Conservation Association unanimously adopted resolution endorsing your bill, S. 3579, 87th Congress, 2d session, a bill to establish water resources research institutes at land-grant colleges and State universities, and to promote a more adequate national program of water research.

I understand your bill, S. 2, 88th Congress, 1st session, is the same as S. 3579, and, therefore, we want to be recorded as endorsing it.

Enclosed is copy of Resolution 5—Water Resources Research Institutes. Please place this in the record of the hearings on S. 2.

Most respectfully submitted.

J. E. STURROCK.
General Manager.

RESOLUTION 5—WATER RESOURCES RESEARCH INSTITUTES

Whereas there is a general feeling among the water conservation leaders throughout the Nation that there is an urgent need for more research in the field of water resources if this country is to meet its long-range water supply needs; and

Whereas Senator Clinton P. Anderson, of New Mexico, has introduced in the U.S. Senate S. 3579, a bill to establish water resources research institutes at land-grant colleges and State universities, and to promote a more adequate national program of water research; and

Whereas the bill provides that "It shall be the duty of each such institute to plan and conduct original researches, investigations, or experiments, of either a basic or practical nature, or both, in relation to water resources, including but not limited to aspects of the hydrological cycle, supply and demand for water; conservation and best use of available supplies; methods of increasing such supplies; economic, legal, social, engineering, recreation, biological, geographic, ecological, and other aspects of water problems, as may in each case be deemed advisable, having due regard to the varying conditions and needs of the respective States and Puerto Rico, to water research projects being conducted by agencies of the Federal Government, and to those related to agriculture being conducted by the agricultural experiment stations"; and

Whereas Senator Anderson said on July 27, 1962, the day he introduced the bill, that it was being introduced at that time for the purpose of making it available to all Members of Congress, to the executive agencies and others interested, so they may give us the benefit of their suggestions and criticisms before next January 1; and

Whereas reprints of the Congressional Record of July 27, 1962, containing Senator Anderson's remarks and copy of S. 3579 have been distributed at this convention: Now, therefore, be it

Resolved, That the Texas Water Conservation Association in convention assembled in San Angelo, Tex., this the 8th day of October 1962, does hereby endorse said bill, S. 3579; and be it further

Resolved, That a copy of this resolution be forwarded to Senator Clinton P. Anderson and to all members of the Texas delegation in Congress.

Unanimously adopted by the Texas Water Conservation Association at its 18th annual meeting in San Angelo, Tex., October 7-8, 1962.

Senator ANDERSON. This concludes the morning session, and we will resume at 2 o'clock with President Morgan of Colorado State as our first witness.

(Whereupon, at 11:40 a.m., the morning session was concluded to resume at 2 p.m. of the same day.)

AFTERNOON SESSION

Senator ANDERSON. This afternoon we are going to hear from a panel of State university and land-grant college representatives, who are entitled to speak with great authority. Their institutions have behind them an unrivalled record of accomplishment, and I have chosen that adjective with some care.

Report No. 1 of the President's Science Advisory Committee, entitled "Meeting Manpower Needs in Science and Technology," has this to say about their record:

Nowhere are the benefits of scientific research more dramatically revealed than in food production. Fifty years ago in this country an agricultural worker produced food for only 3 or 4 others in contrast to his capability to feed 27 individuals today.

This accomplishment can be directly attributed to research that has been systematically supported by the Federal Government, the States and private sources, in programs that have historically and effectively linked education and research. As a consequence, universities have been eminently able to meet changing needs.

They have done such an outstanding job that they were also recognized in the recent reports on natural resources of the National Academy of Sciences-National Research Council.

In its summary report on "Natural Resources," the Academy said:

In adapting their research programs and activities to the requirements of the problems outlined in this report, governmental and nongovernmental agencies

and institutions, should take full advantage of the resources of the universities. * * * It should be remembered that an important by-product of university research is the training that accompanies it, and the committee reemphasizes the need for training research workers to deal effectively with the problems relating to natural resources. These problems require closer cooperation between natural and social sciences.

At that point, the summary report cites a supporting paper, where it says:

One of the more promising channels for this research is in the system of land-grant universities and regional agricultural institutions. Acceptance by them of enlarged responsibilities in the field of natural resources would be a reasonable extension of their present rapidly shifting activities.

I could not agree with the Academy more than I do when it recommends that the land-grant institutions be asked to accept wider responsibilities in the resources field.

It is consequently very gratifying that the National Association of State Universities and Land Grant Colleges has approved S. 2, and that five members of its water resources committee are here today to discuss it with us, headed by Dr. W. E. Morgan, president of Colorado State University and chairman of the association's committee.

He is accompanied by the dean of engineering at Utah State University, Dr. D. F. Peterson; the chancellor of Irvine campus, University of California, Dr. Daniel G. Aldrich; the president of the University of Maryland, Dr. Wilston H. Elkins; and the president of the University of Florida, Dr. J. Wayne Reitz.

I just pause to say, and I want this in the record, we in New Mexico were very happy when Dr. Elkins left Texas Western and went to Maryland because his football teams had a bad habit of beating the University of New Mexico with regularity. We welcomed his transfer.

Dr. Morgan, we would be glad to have your group come to the table together and discuss S. 2 with us in whatever manner you desire. It is a privilege for this committee to have such a distinguished panel of witnesses.

Do come forward now. We are happy to have you.

While they are coming up, let me put a letter in the record.

We have a letter endorsing S. 2 from the chairman of the Kansas Association of Soil and Water Conservation Districts, Mr. Tom Bemis, of the U-Bar Ranch at Plainville, Kans., whom I invited to appear today. He was unable to be here and wrote his views instead.

I might suggest that the Kansas association consider him for a place on their legislative committee, for I observe that he sent copies of his fine letter to the Senators from Kansas, his Congressman, and the Governor.

(The letter referred to follows:)

KANSAS ASSOCIATION OF SOIL AND
WATER CONSERVATION DISTRICTS,
Plainville, Kans., February 15, 1963.

In re Senate bill 2, water resources research.

Senator CLINTON P. ANDERSON,

Chairman, Committee on Interior and Insular Affairs, U.S. Senate, Washington, D.C.

DEAR SENATOR ANDERSON: I have read Senate bill 2, as well as the Congressional Record wherein reference is made to the establishment of a water resources research program as outlined by recommendations of the select Senate committee thereon.

My particular interest in this concept of a water resources research program relates primarily to my interest in the future development of soil and water conservation districts.

It is well known that of recent years soil conservation districts have been adding the word "water" to their titles. There is a definite reason for this inclusion. The reason being that soil conservation and water conservation are renewable natural resources that must be coordinately considered in any land-use conservation program.

Since 1937 every State in the United States has enacted soil conservation legislation, and there are now in existence some 2,900 local conservation districts. They include 92 percent of the Nation's privately owned lands and 96 percent of the farms and ranches; representing three-fourths of the Nation's land area. Thus, most of our fresh water originates on privately owned farm, ranch, and forest land. How farmers, ranchers, and woodland owners deal with that vast land surface determines in large measure the quality and quantity of water that will be available for cities and industry as well as agriculture.

As fresh water supplies become more critical in the near future the responsibility of soil and water conservation districts to actively participate in a known water conservation program will be paramount. Furthermore, there will be a direct concern by the State and Federal Government to insure this responsibility. And, as soil and water conservation districts are responsive to the technical knowledge and technical assistance provided to them by the Federal Government they will be receptive to new obligations beholding to their position of being legal subdivisions of State government.

Therefore, it should be clearly appreciated that any Federal-State cooperation in a program to encourage efficiency in water resources conservation development, and use, will be a vital aid to the execution of the broadening conservation concept being charged to soil and water conservation districts as found in the articles of the USDA Secretary's memorandum No. 1488.

As a water resources research program Senate bill 2 should help establish the necessary Federal-State cooperative means to probe techniques both to increase our fresh water supplies and to increase the efficiency of providing these supplies as needed. From this knowledge, conservation districts could then extend themselves as a readymade medium to help execute these policies on private lands.

It is hoped that Congress will look favorably on senate bill 2, as you have proposed along with other Senators which does include our Kansas Senator, Frank Carlson.

Cordially yours,

TOM BEMIS,
*KACD Research Committee Chairman,
Past KACD Director.*

STATEMENT OF W. E. MORGAN, PRESIDENT OF COLORADO STATE UNIVERSITY, FOR THE NATIONAL ASSOCIATION OF STATE UNIVERSITIES AND LAND-GRANT COLLEGES; ACCOMPANIED BY DR. D. F. PETERSON, DEAN, COLLEGE OF ENGINEERING, UTAH STATE UNIVERSITY; DR. J. WAYNE REITZ, PRESIDENT, UNIVERSITY OF FLORIDA; DR. WILSON H. ELKINS, PRESIDENT, UNIVERSITY OF MARYLAND; AND CHANCELLOR DANIEL G. ALDRICH, UNIVERSITY OF CALIFORNIA, IRVINE CAMPUS, BERKELEY

Senator ANDERSON. Dr. Morgan, I want you to run your show now under whatever rules you determine on and take full charge of this presentation on behalf of these fine schools.

Mr. MORGAN. Thank you, sir.

Senator Anderson, members of the committee, I should like first, sir, to respond to your very generous comments concerning the institutions that we collectively represent. This makes us feel very good and very eager to testify in behalf of this important piece of legislation.

My name is William E. Morgan. I am president of Colorado State University, which is the land-grant institution in the State of Colorado. My appearance here is in the capacity of chairman of the Water Resources Committee of the Association of State Universities and Land-Grant Colleges.

I may say that I am going to file a statement that has all this in it if it will help assist you in any of your secretarial chores.

I wish to thank the committee on behalf of the 74 universities and colleges comprising the membership of the association for this opportunity to speak in their behalf in favor of S. 2, the Water Resources Research Act.

The association I represent endorses, by virtual unanimous vote of its membership, the purposes and objectives of this bill. If your committee desires, a representative from each of these institutions would appear before you in support of the association's stand. In lieu of that, our association, by agreement with your committee staff, is represented here today by personnel from five of the member institutions.

I would like to identify them. You have already indicated their names. I will identify them in the order in which I will ask them to respond in our presentation.

The first is the dean of the College of Engineering of Utah State University, Dr. D. F. Peterson, who is on my right. Dr. Peterson's topic will deal with science and engineering aspects of the research job that confronts the Nation in fields related to water.

Then we have the president of the University of Maryland, who is on the left at the end of the table, Wilson H. Elkins, who will touch on the subject of national requirements for trained manpower and what this bill might do to further the development of that critical resource.

Then we have the president of the University of Florida, Dr. J. Wayne Reitz, who is prepared to comment on water as an economic resource and who also will comment on the funding proposals in the bill.

And then we have the chancellor of the Irvine campus of the University of California who currently is holding down the additional assignment of statewide university dean of agriculture, Dr. Daniel G. Aldrich, Jr. Dr. Aldrich will comment on some of the Federal-State relationships involved and, in discussing some of the bill's potentials, will draw on his experience in a State which has already put forth much effort on research related to water.

And finally I should like to close our discussions with some comments on water as a public resource.

We are especially grateful to the committee for permitting us to deal with the subject in such extended fashion; and now I should like to open our testimony with a background statement on developments that bring us here today as representatives of the Association of State Universities and Land-Grant Colleges.

Every activity of man, every facet of industry, leaves its influence on the water resource. Water, like sunshine and air, is fundamental to life itself, and the right of the individual to enjoy unpolluted water necessary for the essentials of life and health is today more than just a license. Water is a major concern of civilized society. "The story of water is the story of man." As every informed person knows, the demands upon the water resource are rapidly multiplying, and, in an

area embracing nearly one-third of the United States, 1980 demands will exceed the supply.

The rather sudden national awareness of an impending water shortage has naturally led us to talk more and more about water research. Research is today the base for our general welfare. We have found research to be the key to the most productive agriculture of all time; to greatly improved health; to a viable, productive, modern industry; to national security; to an extension of our environment beyond the earth's atmosphere, and to many other desirable objectives. Thus, it is only proper that we should turn to research for assistance in stretching our limited water resources to the limit.

Mr. Chairman, the prepared statement left with your committee goes on to recite initially in inventory fashion some of the monumental works that have been assembled on this subject. I would like to call your attention first to the "Yearbook of Agriculture" published in the year 1955. This book is a compilation of 91 topics related to water, most of them treating the agricultural aspects but not limited to that. Every topic in this book makes reference to the results of research.

And then in 1961 there was held here in Washington a National Water Research Symposium. It was sponsored by the National Reclamation Association and National Association of Soil Conservation Districts. This symposium reported at length on research needs. As a matter of fact, 235 pages in that report dealt with that subject. It was printed as Senate Document No. 35 in the 87th Congress.

And then there is the monumental work of the Senate Select Committee on Water Resources of the 86th Congress. The findings of that committee appear in some 32 papers.

Senator ANDERSON. May I just say that not only the committee worked well and hard on it but I see in the back of the room Ted Schad, who was our professional staff man, and who worked extremely hard and did a very fine job in the preparation of this. It just proves that Senators can turn out good reports if they have a good staff.

Mr. MORGAN. We agree with that, sir. This reference was used many times in the testimony this morning. Again, our group would like to pay our respects to the monumental efforts put forth by that committee and the results that it has brought forth, all of which are printed in the 32 papers of the proceedings.

I would say that those 32 papers should be required reading for anyone who is concerned with the water resources in these United States. The summary of those proceedings lists five recommendations. The third of those recommendations deals with a coordinated program of water research. It concludes that a great deal more such research is needed and it pinpoints some of the deficiencies in detail.

Then in May of 1962 there was published a compilation at the chairman's own request of reports of research from Federal agencies, from State colleges, from other institutions having to do with the subject of water research. This bulletin, the committee print, has in it a table indicating some of the State activities on this subject and appears in my formal statement.

Now, one of the very significant aspects from reading all this material is the revelation of the extent to which the States themselves are active in this area. Attention to this was called in December of 1962

by Mr. Ackerman of the Carnegie Institution of Washington in these words:

The problem of the States is not as to whether there is research for them to undertake but as to what they choose among all there is to do.

Mr. Ackerman's fine statement didn't even mention the purported chain reaction possibilities of coupling research with programs of education. That, of course, is a principal feature, as we see it, of the Anderson bill before us.

And finally, just released yesterday, is this report to the President on the water resource research from the Federal Council for Science and Technology. I find during a hurried scanning of this report this morning after it became available, numerous references to the fact that there is a joint product when an educational institution undertakes research. You not only obtain answers to basic questions. You not only apply some of those answers to the solution of current problems for the moment, local, regional, national problems, problems that are crying for solution, but you get almost as an extra dividend the development of scientific manpower, kind of a multiplication of the supply of the scientific community for the future, if you please.

Senator ANDERSON. Can I interrupt you just a second? I introduced this morning new members of the committee. We are very happy to have Senator Dominick from Colorado. We welcome him and express our appreciation to him for coming with us and serving on the committee.

This paper that you referred to, this last one sent to the President by the Scientific Advisory Committee, we have some copies of it.

We have been asked to have this reprinted either as a Senate document or committee print. If you don't care to express your opinion on it now, we would be very happy to have you do it later. I don't care to waste money printing, but it seems to me this is an important document to have printed and I would like to have your opinion some time, and your associates, as to either having it printed as a Senate document or a committee print, a print of this committee. It struck me that there was a lot of important information in it and we ought to have it in some permanent form and distribute it to institutions, and if you desire extra copies, you can have it in your own work for your institutions.

I would be glad to have your comments as to whether it would be well to have this printed.

Mr. MORGAN. Yes, sir. Senator, I should like to consult with my colleagues before giving you their views but I would like to state mine now. Bulletins like this committee print that summarize the results of your inquiry a year ago, the summary of your select committee, are most useful documents as a ready reference work on your desk or in the bookcase nearby to people on campuses—here I speak with firsthand knowledge—to people in industry, and I am sure to the research establishments in the private sector. I would hope that you see fit to publish this in bound form. Its usefulness is greatly enhanced by having it in bound, published form.

As a second-best choice, of course, the mimeographed bulletin that we received this morning is good, but the printed copies fit your desk, they fit the top left-hand drawer, if that is where you keep the important reference works. I hope you are able to effect quite a dis-

tribution of them, too, so that the usefulness of the publication is thereby increased.

Senator ANDERSON. Thank you very much. If it is published as a committee print or Senate document, it will be published in the same size as that summary you just held up there; yes, that size, and therefore will be more useful.

There was some question about that second document there, the answers to the inquiries, as to whether that document had any real significance after we started to work on the legislation itself. I think we had more mail after we sent this out than we did on almost any document we sent out because a great many people wrote back and said, "I would like to present my point of view." That is what we wanted—points of view. It worked out very, very well indeed.

As you know, the replies in there were carefully prepared and we valued the publication a great deal. It has worked out to be a truly useful publication. I am glad to have your comments on it. So many times we print these things and wonder who if anybody is ever going to read them, but I am encouraged by what you say here today.

Mr. MORGAN. I could submit as exhibit A a dogeared copy that has had a lot of use; so much so, in fact, that one of the sheets near the end is torn, and if additional copies are available, I would like to put in a bid for one.

Senator ANDERSON. Thank you, Doctor. That is the type of evidence we need. I think we can find you another copy.

Mr. MORGAN. Finally, from my own opening statement, I would like to comment on why we think it is important that research effort be undertaken at the State level as well as at the Federal level. May I read the last two pages of this statement.

The position of the State in the check and balance action which ought to be characteristic of the total development of the water resource is highly important. The State must speak for the individual and the community. It must be concerned with the fine-grained synthetic problems of matching resources, people, and economic objectives, enterprise by enterprise and community by community.

In contrast to Federal agencies, which are often dedicated to single functions or missions in a sort of vertical array, the State has the responsibility to provide a positive environment whereby economic elements, of which water is an important one, may be melded at the grassroots level in a horizontal sense, somehow consistent with the overall economic and social aims of the statewide community and the coordinate objectives and policies of the Federal Government.

This is not to overlook or minimize the great responsibility of the Federal Government in water resources, but to point out the importance of the role that the State should play. That the Senate select committee was conscious of the balancing role of the States, as well as of the Federal responsibility, is quite evident from its reports. In its summary report the committee listed eight areas in which action was needed to meet national goals. Area No. 3 was improvement of State and local planning and decisionmaking. Pointing out that most water problems will continue to be local or regional, the committee stated that:

Broadly speaking, national problems are the sum of large numbers of regional and local problems.

The committee noted that—

State and local agencies still play a minor role in many water resource decisions * * * the State and local agencies are in the position of having to approve or disapprove plans without having made comprehensive background studies which are needed before a major decision in the water resource field can be made.

The committee suggested Federal assistance to States for a limited period in order that they might develop capability for comprehensive long-range plans for optimum development of water resources within the State. It is doubtful whether such plans could be effectively made without research on problems that are specific and often unique to them. Certainly assisting the States to establish water resource research centers is consistent with this particular recommendation of the committee and within the Federal responsibility as visualized by them.

A third reason for establishing the State centers as visualized by S. 2 is the broad linkage which this establishes with education. It is in this way that the educational effort might become exponential; that is, like a chain reaction, students associating with research and researchers are more apt to become researchers themselves. Graduate students can contribute to research; research employment may make graduate study attractive. From the point of view of practice, students educated in a research environment will be more knowledgeable and their judgments will be better than otherwise. Regardless of the amount and quality of research information available, it can have no impact upon the water resource except through the myriad elemental decisions made daily by a great many people working within the structure of all the people involved in this decisionmaking process. It is important that the knowledge and wisdom of these decisionmakers at every level be as great as possible. I would expect that the impact of establishing the proposed centers at universities, in terms of improved operational decisionmaking, might well be as great as the research knowledge itself.

Now, sir, I would like to ask Mr. Peterson—

Senator ANDERSON. Before you go on, since you come from Colorado, I thought I would find out if Senaor Allott had any questions he wanted to ask at this time.

Mr. ALLOTT. Thank you, Mr. Chairman. I am very happy to have here Dr. Morgan, whom I have known for many years and whose zealousness and ability for a school, which I always regarded as a competitor when I was in school and which I now regard with the best of any schools in the State, is very commendable. Dr. Morgan has been here before this committee and other committees many times and has been a great help to all of us.

I also wanted at this time particularly to welcome my own new colleague, Senator Dominick, to the committee. This is one of the few instances I believe in which two Senators from the same State, from the same party, serve on a committee, and I am very happy to have him here, particularly because of his great legal ability and his knowledge of water, land, and resource matters.

Doctor, I have one question I would like to ask you because I think your conclusion is a little different from mine.

I am very seriously concerned about the next to the last paragraph of the bill, section 304, which in effect is a waiver of section 3684. I

wonder if you would state your views on this matter and the necessity for it.

Mr. MORGAN. As I understand the meaning of that section, it permits the Secretary, in arranging for research work to be done by one of the centers or other persons, to waive the provisions that require work to be performed before the funds are advanced. Is that correct, sir?

Senator ALLOTT. That is correct. Section 3648 of the Revised Statutes—the bill says 3684. My memorandum says 3648, whichever it is—it provides—

no advance of public money shall be made in any case unless authorized by the appropriation concerned or other law and in all cases of contracts for the performance of any service or delivery of any articles of any description for the use of the United States, payment shall not exceed the value of the service rendered or of the articles delivered previously to such payment.

Now, this proposed bill would waive that. Now, I would like to have your comments on it because this particular section does bother me.

Mr. MORGAN. Senator Allott, for an educational institution, and more particularly a public institution, which is the category in which all of our land-grant institutions fall, the ability to obtain what the commercial world would call operating capital for the performance of the type of services contemplated here, which is a continuing ongoing research function where a professional person is employed, probably on a permanent tenured basis, and to fund cost of the research—this cost consisting of salaries that occur currently, bills that must be paid monthly—without advance payment is for most educational institutions an impossible thing and for the remaining institutions a most difficult thing.

We are public institutions. There are certain limitations in financing inherent in a public institution. The access to commercial lending, for example, is very limited to us. And we are not quite in the category, let us say, of the private enterprise research laboratory that, with a contract in hand, goes to a commercial banker and assigns the proceeds of the contract to obtain operating funds and, in the normal commercial sense, goes on with his business.

Senator ALLOTT. Well, now, Mr. Morgan, the thing to which this refers, which is water research programs, refers also to programs with educational institutions, private foundations or other institutions, private firms and individuals, and with local, State, or Federal governmental agencies. Do you know—I believe, generally that neither the National Science Foundation nor the NIH has a waiver of this provision except in one or two small instances. Am I wrong in that?

Mr. MORGAN. I am under the impression that there is substantial advance funding from those agencies.

Can you help me out on this?

Senator ANDERSON. This is a very important question, Doctor. Will the Senator from Colorado permit me?

Senator ALLOTT. Yes.

Senator ANDERSON. Is there anywhere you can spend money before the legislature appropriates it? You have to wait for legislative action, do you not, before you start spending money?

Mr. MORGAN. That is right, sir. The only legal way we may do it.

Senator ANDERSON. Well, the legal way is the way we want you to work. We don't want to send you to the penitentiary after the nice things Senator Allott said about you.

This isn't like a banking piece of paper that you can take to the bank and borrow on. If one has a contract, that is a good prime commercial paper and you can take it to the bank and borrow on it.

Can you do that?

Mr. MORGAN. Generally our institutions may not.

Senator ANDERSON. I remember one time I went down to see at the Oklahoma State University Henry Bennett. He was borrowing money right and left but what the State of Oklahoma and what he could do and what he worked out doesn't always apply to every State and this is merely an effort to make it possible for you to fund your project. Senator Allott might have put his finger on the fact that it might be made too wide for other than public institutions to get advances, but this is about the only way a State institution could operate under this bill. We wouldn't want the question of funds to bog them down. I may be that private institutions, Senator Allott, could go ahead and get their money. Maybe we ought to eliminate them from the bill, I wouldn't want to say for sure about them at this time but I know these State institutions, for them it is extremely difficult without advances. We are trying to open the door for them and make it possible for them to do research for us. They say yes, we will take on a research project but you have got to fund it for us; we can't fund it in advance under our legislative action. We don't want to wait for the legislature of Colorado to meet and provide advance funds. This is something they would let us do if we waited. We will have to take your appropriation on the same basis as if we had the money appropriated already by the legislature, so it will support the work as it progresses.

Isn't that what you understand the language to be?

Mr. MORGAN. Yes, sir. This is generally the case. I interpret the language here to be permissive.

Senator ANDERSON. Yes. It is permissive.

Mr. MORGAN. It may be undertaken without regard to the provisions of the section involved on a basis of discretionary authority. The exercise of discretion by the contracting authority which would be the Secretary of the Interior in this bill.

Senator ANDERSON. I would be interested in the point that Senator Allott has made. We ought to check this and find out what other agencies do and try to limit it as much as we can, but it would be pretty hard for the land-grant colleges to do it, would it not?

Mr. MORGAN. That is right. The Hatch Act funds are provided in advance. Semiannually now. They used to be annually. This provided institutions operating funds, operating capital, if you please, to carry on going operations.

The business management of a complex university with a very complex pattern of obligations that fall due at unsuspected and uneven times is a real art, and no university administrator I know operates very long without a very skillful business manager.

Senator ANDERSON. Senator Allott, I defer to you. I took too much time.

Senator ALLOTT. That is perfectly all right, Mr. Chairman. I just remarked that when we were considering what is now S. 20 last

year, a similar program, the committee took out this provision because it didn't have—the words used were “pending a more conclusive showing of an actual need for it.”

I asked Mr. Morgan this question because he is aware of my reservations about it and I think it ought to be laid out here so that when the committee considers the bill, we can decide whether we want to limit more, or leave it, or take it out.

Senator ANDERSON. I agree.

Senator MOSS, do you have any questions?

Senator MOSS. I have no questions, Mr. Chairman.

Senator ANDERSON. Senator Dominick?

Senator DOMINICK. Mr. Chairman, I just have a few questions. First of all I would like to express my gratitude to you for the warm welcome to the committee and my pleasure to be on it with you.

Senator ANDERSON. The reason is I heard of your good work in the House and thought it fortunate to get hold of you.

Senator DOMINICK. Thank you. I also want to say it is a pleasure to be on the committee and work with you and Senator Allott and Senator Moss and all the other Senators who do such a fine job here.

I also want to join with Senator Allott in welcoming Dr. Morgan here. Dr. Morgan's college used to be in my congressional district. It still is now that I am statewide. I am delighted to have a chance to be of assistance.

I have some few questions which go to the substance of the bill as a whole. You in the CSU at the present minute are conducting a number of water research programs, are you not, Doctor?

Mr. MORGAN. Yes, sir.

Senator DOMINICK. Including underground water research programs?

Mr. MORGAN. Yes.

Senator DOMINICK. Are you finding that you are having any difficulty in getting funds to continue this type of program?

Mr. MORGAN. The problem of adequate funds for research into the myriad number of problems associated with a resource that is as all pervading as water is a continuing problem that we have on our campus and on other campuses, too, where significant effort is being put forth in water problem research.

If I may answer your question this way, we are confident on our campus that we could put to immediate and instantly productive use any additional funds that came to us for support of research on water problems. We have a standby capability in this area, developed in part from a long history of effort going back into the last century, that has uncovered as many problems as it went along as it solved, or to which it found answer. And thus we are eager to explore the bypaths that show up in a piece of research that is already funded and which must be completed by pursuing the original question to its end.

Senator DOMINICK. Do you know how many institutions in Colorado are now engaged in water research programs?

Mr. MORGAN. I could not answer this categorically. If one interpreted the question broadly, it is probable that every institution in the State is doing research on any significant scale at all is inquiring into some of the problems that are related to this resource.

For example, I happen to be personally acquainted with a friend down at Colorado College, a private liberal arts college. He is engaged in a very interesting inquiry into some of the biological aspects of our Colorado ecology, and I am sure that his results will be helpful to other researchers in their application to specific problems related to water in our State.

I offer this as just a kind of an extreme example of how the universal nature of these scientific problems is so interrelated that, if you pull one thread in one location, you almost invariably affect the fabric at some distant spot down in the weaving.

Senator DOMINICK. Thank you, Mr. Chairman.

Senator ANDERSON. Senator McGovern?

Senator MCGOVERN. Mr. Chairman, I would like to ask President Morgan a question here relating to the funds that are provided in Section 100. It refers to a figure that builds up to \$100,000 for the purpose of establishing a collegewide or universitywide water resources research institute. Could that money be used to fund research projects in an institution such as yours?

Mr. MORGAN. It would not be. We would contemplate its use immediately.

Senator MCGOVERN. For research purposes?

Mr. MORGAN. People who were employed to conduct the research in hand or whose assignments inside the institution were shifted over to this fund because their effort was then put forth on the project to be funded by this? Is this your question, sir?

Senator MCGOVERN. Would it be used to pay salaries of research people?

Mr. MORGAN. It would be used to pay salaries. It would be used to pay the normal expenses of conducting a research center. Senator, we have a member of our panel who is going to speak specifically to this point. May we defer that, sir?

Senator MCGOVERN. All right.

Senator ANDERSON. Are there other questions?

Thank you very much, Dr. Morgan.

(The full prepared text of Mr. Morgan is as follows:)

PREPARED STATEMENT OF WILLIAM E. MORGAN, PRESIDENT, COLORADO STATE UNIVERSITY, AND CHAIRMAN, WATER RESOURCES COMMITTEE, ASSOCIATION OF STATE UNIVERSITIES AND LAND-GRANT COLLEGES

My name is William E. Morgan. I am president of Colorado State University which is the land-grant institution in the State of Colorado. My appearance here is in the capacity of chairman of the Water Resources Committee of the Association of State Universities and Land-Grant Colleges. I wish to thank the committee on behalf of the 72 universities and colleges comprising the membership of the Association for this opportunity to speak in their behalf in favor of S. 2, the Water Resources Research Act.

The association I represent endorses, by virtual unanimous vote of its membership, the purposes and objectives of this bill. If your committee desired, a representative from each of these institutions would appear before you in support of the association's stand. In lieu of that, our association, by agreement with your committee staff, is represented here today by personnel from five of the member institutions. I should like to introduce these gentlemen and indicate the portion of the association's testimony which each is prepared to present.

First we have the Dean of the College of Engineering, Utah State University, Dr. D. F. Peterson, whose topic is science and engineering aspects of the research job that confronts the Nation in fields related to water.

Next we have the President of the University of Maryland, Wilson H. Elkins, who will touch on the subject of national requirements for trained manpower and what this bill might do to further the development of that critical resource.

Then there is the president of the University of Florida, Dr. J. Wayne Reitz, who is prepared to comment on water as an economic resource and who also will discuss the funding proposals in the bill.

Next we have the chancellor of the Irvine campus of the University of California, who currently is holding down the additional assignment of statewide university dean of agriculture, Dr. Daniel G. Aldrich, Jr., who is to comment on some of the Federal-State relationships involved and who, in discussing some of the bill's potentials, will draw on his experience in a State that has already put forth much effort on research related to water.

Finally, I should like to conclude with a statement on water as a public resource.

We are especially grateful to the committee for permitting us to deal with the subject in such extended fashion, and now I should like to open our testimony with a background statement on developments that bring us here today as representatives of the Association of State Universities and Land-Grant Colleges.

Every activity of man, every facet of industry, leaves its influence on the water resource. Water, like sunshine and air, is fundamental to life itself, and the right of the individual to enjoy unpolluted water necessary for the essentials of life and health is today more than just a license. Water is a major concern of civilized society. "The story of water is the story of man."¹ As every informed person knows, the demands upon the water resource are rapidly multiplying and in an area embracing nearly one-third of the United States, 1980 demands will exceed the supply.²

The rather sudden national awareness of an impending water shortage has naturally led us to talk more and more about water research. Research is today a base for our general welfare. We have found research to be the key to the most productive agriculture of all time; to greatly improved health; to a viable, productive, modern industry; to national security; to an extension of our environment beyond the earth's atmosphere, and to many other desirable objectives. Thus, it is only proper that we should turn to research for assistance in stretching our limited water resources to the limit.

RECENT COMPILATIONS OF WATER RESEARCH NEEDS

An early publication which recognized the desirability of research on water was the U.S. Department of Agriculture Yearbook for 1955 entitled "Water." This publication included discussions of 91 topics relating to the use of water. These are primarily of interest to agriculture, but, in many cases, are of wide general interest also. I do not think this publication was designed to be simply a research report, yet the discussion of every topic includes major reference to the results of research.

In 1961 the National Reclamation Association and the National Association of Soil Conservation Districts held a national water research symposium in Washington, D.C. Scientists, engineers, and public officials of national stature in the field of water resource development and use reported research needs. These reports were later published as Senate Document 35, 87th Congress, 1st session, and fill 235 pages.

The extensive study of the Senate Select Committee on Water Resources, 86th Congress, brought a new and realistic perspective to the water resource picture but stressed the importance of research. The impacts of the various water needs were weighed against the supplies and local and regional differences were considered in detail. The reports of this study did much to "clear the air" and they quite clearly show the critical areas, not only geographically, but in terms of technology and public policy as well. While the urgency varies, the need for action is evident in all regions and for all kinds of uses, but it is clear that intelligent planning, cooperative action, continuing assessment of problems, and positive steps or incentives to encourage efficient use, backed up by research, can greatly extend our capability to match demands with supplies. Much of the report, which consists of 32 separate papers, is concerned with research. Indeed, the report itself is the result of research. Print No. 28 written by the Department of Agriculture is entitled "Water Resources Research Needs" and discusses a great many specific areas of research. Ten other prints, Nos. 21 to 27 and 29 to 31, are primarily reports of research accomplished, of future research needs in specific areas, and of the possibilities for application of

¹ Bernard Frank in "Water," U.S. Department of Agriculture Yearbook, 1955.

² "A Better Gage of the Water Outlook," annual report, Resources for the Future, Inc., Washington, D.C., 1960, pp. 14-24.

research results in these areas. These reports thus quite comprehensively cover the research picture and should be "required reading" for those concerned with water research programs. It would be quite unlikely that I would add anything new to this vast cataloging of research needs. Hopefully perhaps some emphasis might be given to certain aspects of research, especially in relation to the concept of State research institutes as visualized by S. 2.

The summary report of the select committee³ emphasizes research. On the basis of the results of the study, five recommendations were made. Recommendation No. 3 requested a coordinated program of water research, and in discussing this recommendation, the committee stated its belief "that a great deal more research and demonstration is needed on almost all phases of water resources." Deficiencies in present research programs were discussed in some detail. In part II E, section 4, the committee delineated and discussed 17 specific research areas.

In May 1962, Senator Clinton P. Anderson, chairman of the Committee on Interior and Insular Affairs of the U.S. Senate, asked for reports on water resources research from the Federal departments, land-grant colleges and State universities, other public, educational and private institutions, and individuals in each of the 17 categories of research suggested by the Senate select committee. The results of these inquiries are summarized and appear in a committee print⁴ of the 87th Congress, 2d session. The contributions of the land-grant and State universities and other institutions illustrate the broad base on which important water research is already founded as well as emphasize the fact that many educational institutions are already contributing significantly to the effort in water resources research. Table 1 summarizes these contributions.

TABLE 1.—Land-grant universities, agricultural experiment stations, and other institutions engaged in water resources research

Categories	Number of institutions		
	Land-grant universities	State agricultural experiment stations	Other institutions ¹
(a) Evaporation reduction.....	19	-----	3
(b) Phreatophytes.....	14	-----	2
(c) Evapotranspiration reduction.....	24	19	7
(d) Reduction of wasteful irrigation practices.....	21	9	5
(e) Waste treatment and control.....	31	-----	14
(f) Waste water salvage.....	8	3	5
(g) Industrial water conservation.....	10	-----	8
(h) Desalting.....	11	1	6
(i) Weather modification.....	17	-----	2
(j) Hydrometeorologic forecasting.....	17	25	8
(k) Application of nuclear products.....	9	2	6
(l) Groundwater use and control.....	27	16	7
(m) Economic incentives.....	2	-----	-----
(n) Alternative water use.....	8	-----	1
(o) System planning.....	9	-----	5
(p) Economic effects of existing projects.....	19	-----	5
(q) Engineering problems.....	15	-----	10

¹ This column includes State universities other than land-grant, private universities and foundations, institutes and corporations. While all land-grant universities and State experiment stations were doubtless canvassed, conceivable there could have been omissions in the canvas covering other institutions. It is likely, also, that some research efforts of agricultural experiment stations were not distinguished from the associated land-grant universities.

INTEREST OF STATES IN WATER RESEARCH

It would appear that the need for increased water research and the broad areas in which this need occurs are quite well established. The question is, What shall be done first and who shall do what? In a paper given at Chicago in 1962,⁵

³ Report of the Select Committee on National Water Resources pursuant to S. Res. 48, 86th Cong., together with supplemental and individual views, committee print, 87th Cong., 1st sess., S. Rept. 29, Jan. 30, 1961.

⁴ "Water Resources Research." Memorandum of the chairman to the Committee on Interior and Insular Affairs, U.S. Senate, September 1962.

⁵ "Water Research Needs." Edward A. Ackerman, Carnegie Institution of Washington. Address before Interstate Conference on Water Problems, Chicago, Ill. Dec. 4, 1962.

Edward A. Ackerman said: "The problem of the States is not as to whether there is research for them to undertake but as to what they choose among all there is to do." Ackerman suggested that the States should consider those research needs that are particularly suited to attention and initiative on the part of State governments. He pointed out the great differences between the social and natural environments that exist in the various States and suggested that the determination of what research needs are "starts with politics and policy." Ackerman asked:

"What are reasonable objectives for the development of the State in the future? Is it minimizing employment [sic]? Or income? Is it creation of an economic base to attract a greater number of residents? Or is a determined effort needed to preserve action to prevent deterioration of resources and amenities? Even in these few questions a distinction can be seen between the proper objectives of Alaska, California, West Virginia, or South Dakota."

Ackerman did not suggest any other restrictions on the type or subject matter of the research to be done by the State, nor did he discuss the possibility for coupling the research with programs of education, as is anticipated by Senate bill 2 in providing for establishment of research centers at universities. In a university context, part of the research done should be basic.

Linking research and education adds vast new dimensions to the potential of the proposed effort. One of the overwhelming reasons for a university connection relates to the development of manpower, both in terms of numbers and in quality of their education. This manpower subject will be discussed in detail by one of my colleagues so I will restrict my remarks on it to some limited comments later on and return to the question of why State water resource centers are needed. Why should part of the water research effort be undertaken at State levels rather than exclusively by Federal agencies?

One important reason already suggested stems from the large differences that exist among the States. These differences involve not only great variations in the nature of the resource itself and the degree to which the resource has been developed, but also in the detail of the economic and social structure. These differences are reflected in the political and policy aims of the various States.

The differences in the resource and the degree and nature of its development were pointed out by the reports of the Senate Select Committee on Water Resources, especially by prints Nos. 6 and 32. As an example, many Western States, limited in their water resources to begin with, have placed great pressure on the resources because of the steady demand for irrigation. The availability of dilution water for pollution control and for cooling, already low, bears a further reduction because of the high consumptive use of irrigation. On the other hand, water transportation is not a significant factor in most Western States. The significance of water in recreation is primarily in maintaining the attractiveness of the vast areas of unoccupied watersheds. The consumptive use of the water resource is approaching a practical saturation limit so that new uses essential to economic development must occur in most instances at the sacrifice of some present use. In contrast, a typical Eastern State might have a primary interest in maintaining river navigation. Waste dilution demands and pollution become the significant factors dominating allocation of streamflow rather than consumptive use for irrigation. Irrigation is limited and sporadic, depending on season. Recreational use of unoccupied land is quite limited and direct utilization of water for fishing, boating, etc., is relatively more important in the recreational picture.

The differences between even adjoining States are apt to be greater than one might think. Utah's development is mostly based on the short, snow-fed streams of the Wasatch front discharging onto the desert floor. This has resulted in the development of rather small, generally independent irrigation units. Idaho's streams are larger; occurrence of groundwater in fractured lava is common. Differences in climate, elevation, and soil have generated significant differences in problems of agricultural use of water. In Wyoming there are many scattered irrigation developments, often associated with ranching and fairly large irrigation projects principally on the North Platte and its major tributaries. One could continue to recite these resource differences in detail.

The differences in the economic-social detail as among States may even be greater than the resource differences. The particular lines which future economic development may take are highly unique State by State. These are greatly influenced by the nature of natural resources, other than water, such as minerals, fuel, and timber (including their accessibility, and their quality in relation to competitive sources, etc.); by transportation; by the nature of the population

resource (such as degree of urbanization, geographical distribution, and nature of occupational capabilities and social background); by educational activities; by the administrative and legal structure; by taxation practices; by the availability of markets; by recreational resources; by strategic resources; by Federal interest in public lands, and by many other factors. These differences lead to unique and different policies and objectives.

The position of the State in the check and balance action which ought to be characteristic of the total development of the water resource is highly important. The State must speak for the individual and the community. It must be concerned with the fine-grained synthetic problems of matching resources, people, and economic objectives enterprise by enterprise and community by community. In contrast to Federal agencies in the field, which are often dedicated to single functions or missions in a sort of vertical array, the State has the responsibility to provide a positive environment whereby economic elements, of which water is an important one, may be melded at the grassroots level in a horizontal sense, somehow consistent with the overall economic and social aims of the statewide community and the coordinate objectives and policies of the Federal Government. This is not to overlook or minimize the great responsibility of the Federal Government in water resources, but to point out the importance of the role that the State should play. That the Senate select committee was conscious of the balancing role of the States, as well as of the Federal responsibility, is quite evident from its reports. In its summary report⁶ the committee listed eight areas in which action was needed to meet national goals. Area No. 3 was improvement of State and local planning and decision-making. Pointing out that most water problems will continue to be local or regional, the committee stated that, "Broadly speaking, national problems are the sum of large numbers of regional and local problems." The committee noted that "State and local agencies still play a minor role in many water resource decisions * * * the State and local agencies are in the position of having to approve or disapprove plans without having made comprehensive background studies which are needed before a major decision in the water resource field can be made."

The committee suggested Federal assistance to States for a limited period in order that they might develop capability for comprehensive long-range plans for optimum development of water resources within the State. It is doubtful if such plans could be effectively made without research on problems that are specific and often unique to them. Certainly assisting the States to establish water resource research centers is consistent with this particular recommendation of the committee and within the Federal responsibility as visualized by them.

A third reason for establishing the State centers as visualized by S. 2 is the broad linkage which this establishes with education. It is in this way that the educational effort might become exponential; that is, like a chain reaction, students associating with research and researchers are more apt to become researchers themselves. Graduate students can contribute to research; research employment may make graduate study attractive. From the point of view of practice, students educated in a research environment will be more knowledgeable, their judgments will be better than otherwise. Regardless of the amount and quality of research information available, this can have no impact upon the water resource except through the myriad elemental decisions made daily by a great many people. It is important that the knowledge and wisdom of these decisionmakers at every level be as great as possible. I would expect that the impact of establishing the proposed centers at universities, in terms of improved operational decisionmaking, might well be as great as the research knowledge itself.

Senator ANDERSON. Let us run through the next four presentations without question, and then come back all at one time.

I only wanted to break in at this point because we had two Colorado Senators here who may leave to go to the floor, and I thought it was fine to give them a chance to ask you questions.

Mr. MORGAN. Yes, sir. Well, I will say as a matter of personal interest that I am happy to know that there are two Colorado Senators, including my former Congressman, now on this committee.

May I ask Dean Peterson to comment on the scientific phase.

⁶ Ibid., p. 3.

Senator ANDERSON. Dean Peterson, we are very happy to hear from you.

STATEMENT OF DR. D. F. PETERSON, DEAN, COLLEGE OF
ENGINEERING, UTAH STATE UNIVERSITY

Mr. PETERSON. Thank you, Senator Anderson. I am very happy to be here today.

The task that has been assigned to me is to talk about the scientific and engineering research needs. Dr. Morgan has already indicated the great volume of material that has been written that has outlined these needs in considerable detail. I am not quite sure how I can compete with this tremendous library of needs that have already been compiled. What I propose to do, therefore, is to mention a few of the items which are particularly attractive; and, in doing this, I will depart somewhat from the prepared text that I proposed to file with the committee.

I hope I can do this without sounding too much like a professor. I am only one step removed from the classroom, whereas my colleagues here are at least two steps removed.

One shortcoming of water resources research is that there isn't enough basic scientific knowledge so that the engineering research and the technological research can always be efficient. Engineering research shouldn't have to stumble up blind alleys of trial and error because there aren't guideposts of sound scientific research to help out.

I would like to mention two or three examples of basic scientific research which would subtend large areas of engineering research capability, that is, areas on which engineering could be founded.

One of these is the matter of evaporation control. The lakes and rivers of the United States evaporate a tremendous amount of water.

We have made some efforts to control this evaporation. These efforts have been largely in terms of field trials, learning how to apply monomolecular films, and so forth. We need to attack the basic physical chemistry of this film to understand exactly how the molecules go through it, what are the energy relations, and so forth. If we would do this systematically, I am sure that the process of doing the engineering and placing this scientific possibility into action would be greatly shortened.

Much has been said about desalinization. The promise of producing inexpensive water under present systems is not very good. However, theoretically the promise that we might get this down to quite a reasonable cost is good. So we need to do this basic research to find a way to utilize this wherever possible.

In atmospheric physics and weather modification, about 12 years ago the work of Langmuir and his associates at GE brought forth a great rash of cloud seeding and weather modification experiments. Most of these had little scientific basis or hope of success. Nevertheless, there were some careful evaluations made. Dr. Workman, of New Mexico Mining & Technology, did an outstanding example of this kind of scientific investigation. We need to continue this work on a little different tack. The entire atmosphere needs to be studied, development of storm systems, for instance, and the development of individual rain cells over arid land, which promises to be an area of fruitful research.

I might mention that the existence of man and his civilization as we know it has already begun to modify rather seriously the lower atmosphere. I would mention the smog in California, if it would not hurt Chancellor Aldrich's feelings. The possibility of modifying the upper atmosphere is even greater. Because they are very dense, a few tons of exhaust gases could lead to considerable modification in the upper atmosphere.

There is also the matter of macrometeorology which is the interaction between the lower atmosphere and the earth.

Another basic process is the matter of plant transpiration. This may be a sort of "way out" proposal, but at the present time a plant transpires as much as 500 pounds of water to produce one pound of dry material. It may be possible to develop methods which would reduce this ratio of water transpiration to production of usable dry material. Breeding techniques might produce plants which were more efficient in their use of water. This has already been done in the case of grain sorghums which are used in the western Great Plains. These are drought resistant and have low water requirements.

As for the matter of water-soil system: Nearly all water which falls on the earth passes into the soil, moves through the soil, either out through the plant or into the rivers or the ground water reservoirs. Agriculture has done a great deal of work in this field and especially in relation to plant growth. We need to extend this generally. I am sure that we will begin to want to use the soil mantle, or at least to study the use of a soil mantle, in relation to the disposal of wastes.

I am not going to discuss morphology and stream development. My remarks will be contained in the record. I would, however, like to say something about hydrology. Hydrology has been defined as the science that treats of the waters of the earth, their occurrence, circulation, and distribution, their chemical and physical properties, and their reactions with their environment, including their relation to living things. The domain of hydrology embraces the full life history on the earth.

Now, the reason I would like to say something about this is that hydrology is a basic science. It is, however, a derived science. It is synthesized from a number of physical sciences. It is the servant of all water resources development and planning. However, hydrology as it exists today has been gerrybuilt as needed to further our immediate objectives of civil engineering, forestry, and so forth, and researchers in this science usually switch hats from their basic disciplines to work in this field. This approach is neither efficient nor very specific. The treatment cannot help but be superficial instead of fundamental. The deficiencies in hydrology have been recognized by many reports, including those of the Senate Select Committee on Water Resources, and the Ad Hoc Panel on Hydrology.

In 1962 under a project sponsored and financed by the University of California Water Resources Center, a conference was called of representatives of 20 universities, together with observers from the Federal agencies with programs and interests in hydrology. This led to the formation of the university's council on hydrology. The first two objectives of this council were (1) to represent the university community in activities aimed at encouraging the growth of education and research in hydrology, and (2) to provide and disseminate

information considered necessary for an adequate representation of the status of hydrological education research.

As of January 17, 1963, the following universities were members of this council: University of Arizona, University of California at Berkeley, University of California at Los Angeles, California Institute of Technology, University of Chicago, Colorado State University, Cornell, Georgia Institute of Technology, University of Illinois, University of Idaho, University of Iowa, Johns Hopkins, Massachusetts Institute of Technology, Michigan State University, Southern California, Stanford, University of Texas, Utah State University, Washington State University, University of Washington, and University of Wisconsin.

These universities have determined to proceed in building an interdisciplinary science and capability in hydrology. The formation of the proposed water resources centers would certainly further the progress of this endeavor.

Now, with regard to engineering research, these range from very simple tasks such as a gate to close and open the entry of an irrigation lateral to a very, very complex system of river development such as we see on the Colorado River. This latter may involve water supply, storage, hydroelectric power, flood control, irrigation, and drainage.

At least one report has been made on engineering research needs that relate to water resources. This resulted from a panel study on basic research in civil engineering fields as related to water resources held at Fort Collins, Colo., in June 1961 under the sponsorship of the American Society of Civil Engineers, the U.S. Bureau of Reclamation, and Colorado State University. Sixty-five engineers of considerable eminence participated in these panels. They delineated seven areas of research. The whole report is of interest but I will quote only two conclusions which are most relevant.

Conclusion 3 says:

Research in the field of water resources is not being supported adequately and it is clear that the current level of research activity must be increased severalfold if it is to keep pace with the projected requirements.

Conclusion 4 said:

Expenditures for research in the field of water resources should be increased from the present level of less than two-tenths of 1 percent of funds spent on related constructions to a figure of about 1½ percent of construction funds.

I will mention a few samples of engineering areas which will illustrate the need for engineering research.

Engineering structures and devices: Almost every change that man imposes on a water resource is by the use of some kind of an engineering structure or device. I suppose the major portion of the money by far which is invested in water research development goes to design and build these devices and structures. I think there is a continuing opportunity to improve the efficiency and reduce the cost of these devices. I might say that in general the cost of such devices is too great—is so great that it prohibits the development of some of our minor marginal water resources.

Another topic is the matter of information sensing, telemetering, processing and interpretation. Compared to systems that we are using in astronautics, when we can go to Venus 53 million miles away and collect hydrometeorological data, techniques we use in this field are

primitive and generally expensive. We need to measure better such streamflow characteristics as discharge, sediment transport, pollution, quality and temperature, and to make these readily available to researchers. We need more modern techniques which can increase these efforts so that they will be adequate to the task.

Another area is hydraulics. Hydraulics is the study of the flow of water, and this is the basic analytical tool which every engineer uses in developing his structures. Irrigation and drainage draw on most aspects of engineering and the agricultural sciences. These are synthesized into a system which is part socioeconomic in nature. The industrialization of the West will probably not decrease the economic attractiveness of irrigation but it will compete for the same water resources. The needs for research in irrigation and drainage are too broad to outline in detail. The importance of the physical and biological sciences will continue but increased emphasis will be given to economic and institutional aspects of irrigation.

I personally am convinced that irrigation agriculture is extremely sensitive to the socioeconomic environment. I think it is important to note that, by chance or otherwise, the friendly or neutral undeveloped nations of south Asia and the Mideast, north Africa, Latin America, lie in climatic zones and possess natural resources such that irrigated agriculture must usually be a very dominant element in their development.

Waste disposal and pollution control has already been mentioned. This is the overwhelming problem that imposes the ceiling limitations on our water resources development. It seems, therefore, that it would be urgent to investigate every possibility, no matter how farfetched it appears, which could possibly mitigate the effects of the load which waste disposal places on our streams.

Areas of investigation which might be considered include improved treatment processes, accelerated regeneration of stream oxygen, systems of waste transport and disposal which do not require water or use of streams, more objective limits on pollution standards, and continued reduction of industrial pollution by alternate systems and improved methods.

Systems engineering. Systems engineering is a technique for analyzing and developing complex systems which give you optimum objectives or which meet the objectives in an optimum manner. Systems engineering has been developed in many areas of engineering such as astrophysics and aeronautical engineering, but has had little application to water resource development.

Water-demand management is another important area. We usually think of finding a water supply in order to meet a specific demand rather than adapting demand to the supply. If we could match our demand to existing supplies a little better, then we would have more efficient utilization of the resource. To do this, we would need to find incentives which would get people to comply with this type of an approach. So we need research not only to see how much of this is possible but also to develop the incentive systems that might make it possible.

Ground water resource represents one of our greatest potentials for increasing our water supply. There are a great many things about ground water management that might be improved. For example,

ground water has the capability of being free from evaporation in the atmosphere generally. Ground water resources can be seriously damaged and wasted if they are improperly exploited. Research could lead to the most sensible public policies on ground water conservation.

I hope these limited remarks may serve as illustrative examples of the job that is before us. I think that it will be apparent that these examples and many others will be accelerated by the program proposed by Senate bill 2. I think water research problems will have to be attacked item by item, location by location. They must be closely linked to community and individual objectives and State research efforts will greatly assist the States in discharging their responsibilities in planning development.

Senator Anderson, I believe this covers in a general way a sort of index of research that might be basically helpful to the job that we are trying to do. I thank you for the opportunity to be here.

Senator ANDERSON. Thank you, Dr. Peterson. You have made a very fine statement and I appreciate it very much.

(The full prepared text of Mr. Peterson is as follows:)

STATEMENT OF DR. D. F. PETERSON, DEAN OF ENGINEERING,
UTAH STATE UNIVERSITY

President Morgan has mentioned the compilations of research needs that have already been made. It would be inappropriate to do anything more than cite these compilations and perhaps place some emphasis on certain urgent research considerations. In doing this I will divide the subject into two topics, basic scientific research and engineering research.

BASIC SCIENTIFIC RESEARCH

Perhaps one shortcoming of water resource research is that there is not enough basic scientific research being conducted so that engineering and technological research can be efficient. Engineering research should not have to stumble in endless blind alleys because the guideposts of basic scientific knowledge are lacking. I would like to mention a few examples of basic research endeavor that appear particularly attractive to me, especially in the context of a university related research facility. The subjects are not in any order of priority.

Evaporation control

A very large share of our basic water supply is lost to the atmosphere by evaporation from lakes and streams. Efforts to control this loss by use of monomolecular films have been largely limited to field trials, systems of application, and evaluation of such suppressants applied to bodies of water. More basic effort should be devoted to the physical chemistry of the film system and its relation to the water body and the atmosphere. There is doubtless much that could influence the molecular nature of the film; fundamental understanding of the film and its air and water interfaces could doubtless accelerate the progress of engineering research.

Desalinization

A great deal of effort has already gone into desalinization research. Present systems do not show promise of producing inexpensive water; however, the costs of the theoretical energy requirements are of the order of one-tenth or less of minimum anticipated costs using present known systems. Basic research which could lead to new systems would appear promising.

Atmospheric physics and weather modification

Laboratory demonstrations by Langmuir and other in the late 1940's of the effectiveness of artificial nucleation in condensing water vapor from supersaturated air led to vast expenditures for cloud seeding. Some carefully controlled field experiments yielded information of value, however, much of the cloud-seeding effort was made with little scientific basis for success and with no hope for evaluation. Nevertheless, much has been learned, new re-

search tools have been developed, and great new vistas for basic study of atmospheric physics have been opened.¹ Besides the physical chemistry of the air-water vapor system continuing studies of the atmosphere itself will undoubtedly yield information of great value. There is no doubt that nucleation under certain conditions will induce precipitation; however, the need for sublimation nuclei under natural conditions is still somewhat obscure. Modification of the atmosphere is certainly a possibility, but, as Workman implies, this might perhaps best be studied from the point of view of energetics. There have been major changes in climate in the recent geological past. Modern man has already modified at least the lower atmosphere locally and, it appears that the extreme upper atmosphere, where densities are extremely low, might quite easily be modified significantly with relatively small releases of rocket exhaust. Besides the gross atmosphere, future studies should include storm systems as well as basic physics. Formation of convective thunderstorms associated with diurnal heating, especially in arid regions, would seem to be a fruitful topic for continued study and considerable progress along these lines has already been made in the Southwest. Micrometeorology, that is the detailed physics of the lower atmospheric boundary, has great significance relative to evaporation, transpiration from plants and sublimation and melting of snow and ice. Much more detail is needed.

Transfer processes

This refers to the mechanism by which a physical quantity, mass, energy, or momentum, is transferred from a source. While all transfer processes are not mathematically identical, there is general mathematical resemblance among them. Transfer processes occur widely in the hydrologic cycle and include such phenomena as evaporation of water into the atmosphere, scouring and transport of sediment, viscous drag between a stream and its boundaries, and heating of the atmosphere by thermal conduction from the earth's surface. Increased general basic research in this field will multiply the analytical tools of the scientist or engineer in many aspects of water research.

Stochastic models

To the scientist all events must be weighed in terms of their probability. Techniques for describing complex relations between hydrologic events could result in reliable but extremely complex mathematical descriptions. Information theory has made great progress in applying new mathematical techniques to communications. These techniques should be extended to hydrologic and hydraulic problems. Improved stochastic models could define much more accurately hydrologic and climatologic events of wide public interest. The dry farmer could know the odds for adequate rain rather exactly; the design flood might be determined much more accurately by the spillway designer, etc.

Plant transpiration

A tremendous amount of water passes into the atmosphere through the plant's respiratory system. For every pound of dry material produced by plant growth the amount of water which must be transpired is of the order of 500 pounds. Perhaps it is farfetched to suggest that practical methods which would reduce transpiration might ever be developed, it may nevertheless be worthwhile to study the basic transpiration process in greater detail. Plant breeding techniques could be utilized also to improve the drought resistance and lower the water requirements of certain crop varieties. This has already been done for specialized varieties of grain sorghums used in the western Great Plains.

Water-soil systems

Nearly all the water which falls on the earth's surface enters the pores of the soil mantle during some part of the hydrologic cycle. Thus, the interaction between water, entrapped gases, and the soil is of great significance. In this connection, I use the term "soil" to include all of the unconsolidated fragments of the earth's mantle, rather than restricting it to the portion in which plants grow. Agriculturists have long been concerned with the dynamics of soil-water systems under the forces generated by surface tension, gravity, thermal and chemical gradients, and osmotic pressure, and with the chemical transfers between the soil, water and plant. Much basic knowledge has already been contributed by them. This work, extended to the general soil mantle, is far from complete however, but its impact transcends most of engineering and hydrology. Some

¹ For example, see Workman, E. J., "The Problem of Weather Modification," *Science*, vol. 138, No. 3538, Oct. 19, 1962.

practical questions in which detailed basic information is needed relate to the disposal of pollutants in the soil, entry of surface waters, ground water development, and water movement in relation to the production of streamflow by watersheds.

Morphology and stream development

Study of stream formation in relation to surface morphology could yield results of extremely useful engineering significance. Man never really harnesses a river; more properly he lives with it because the modifications he makes are usually of petty geologic significance. Even though geological processes are long, man's lifespan is not too short to encounter some of these when he deals with a river. Siltation, periodic flooding and erosion are part of these processes and we may well have to live with some of them. Sometimes I think our judgment is rather poor in the way in which we try to modify and interrupt some of these processes. On high watersheds, study of stream morphology could perhaps lead to methods of estimating streamflow hydrology.

Hydrology

Hydrology has been defined as "the science that treats of the waters of the earth, their occurrence, circulation, and distribution, their chemical and physical properties, and their reactions with their environment, including their relation to living things. The domain of hydrology embraces the full life history of water on the earth."²

Hydrology is interdisciplinary, deriving from many basic sciences such as physics, chemistry, and geology and is of great interest to such disciplines as agronomy, biology, civil engineering, forestry, geography, irrigation, and meteorology. Hydrology, such as it exists today, has been somewhat "jerry built" as needed to further the rather immediate objectives of civil engineers, agronomists, foresters, etc., and usually members of these disciplines have "switched hats," sometimes temporarily, to study hydrology as it relates to their own specific problems. This approach is neither efficient nor very scientific. It means that the treatment will emphasize the superficial rather than the fundamental; indeed, it is hard to see how anything very fundamental could come from this approach. The deficiencies in hydrology have been recognized in recent years by several reports, including those of the Senate Select Committee on Water Resources and the Ad Hoc Panel on Hydrology. The latter report stated:

"The water development and management problems of the last few years have created a need for scientific hydrology that exceeds the capacity of the relatively few individuals who have come into the field from bordering disciplines. The time has come to encourage colleges and universities to make a conscious effort to develop scientists trained to work on hydrologic problems from a broad base in the fundamental sciences."

In August 1962, under a project sponsored and financed by the University of California Water Resources Center, a conference was called of representatives of 20 universities and observers from the Federal agencies with programs and interests in hydrology. This led to formation of the Universities Council on Hydrology (UCOH). The first two objectives of this council are as follows:

(1) To represent the university community in activities aimed at encouraging the growth of education and research in hydrology. It is intended that all academic disciplines within the university which are concerned with hydrology be represented.

(2) To provide and disseminate information considered necessary for an adequate representation of the status of hydrologic education and research.

As of January 17, 1963, the following universities were members of UCOH:

University of Arizona
University of California, Berkeley
University of California, Los Angeles
California Institute of Technology
University of Chicago
Colorado State University
Cornell University
Georgia Institute of Technology
University of Illinois
University of Idaho
University of Iowa

Johns Hopkins University
Massachusetts Institute of Technology
Michigan State University
University of Southern California
Stanford University
University of Texas
Utah State University
Washington State University
University of Washington
University of Wisconsin

² "Scientific Hydrology." Ad Hoc Panel on Hydrology of the Federal Council for Science and Technology, Washington, D.C., 1962.

Hydrology is the servant of all disciplines concerned with water resources. Increased basic research is essential and the universities, with the encouragement of Federal agency representatives, have determined to build a program founded on both education and research. The formation of Water Resource Centers as proposed by S. 2 would most certainly further the progress of hydrology as visualized by the Universities Council.

ENGINEERING AND APPLIED RESEARCH

Engineering tasks in water resources may range from the development of a very simple device, such as a gate to open and close the entry of an irrigation lateral to a vast river development system involving water supply, storage, hydroelectric power, flood control, and irrigation and drainage. At least one report has been made recently on engineering research needs that relate to water resources. This resulted from a panel study on "Basic Research in Civil Engineering Fields as Related to Water Resources," held at Fort Collins, Colo., in June 1961 under the sponsorship of the American Society of Civil Engineers, the U.S. Bureau of Reclamation, and Colorado State University.³ Sixty-five engineers, most of considerable eminence, participated in these panels, which included (1) static and dynamic behavior of soils, (2) static and dynamic behavior of rock, (3) static and dynamic behavior of concrete, (4) fluvial hydraulics, (5) hydraulics of water conveyance, (6) flow in porous media, and (7) conservation and utilization of water. Engineering research on the last four topics listed would be accelerated by establishment of the proposed Water Resources Research Centers. While the entire report of the panel is of interest, I will quote only the two conclusions most relevant:

* * * * *

"3. Research in the field of water resources is not being supported adequately and it is clear that the current level of research activity must be increased severalfold if it is to keep pace with the projected requirements.

"4. Expenditures for research in the field of water resources should be increased from the present level of less than 0.2 percent of the funds spent on related constructions to a figure of about 1½ percent of construction funds."

* * * * *

As with basic research, anything resembling a complete summary of engineering research needs is impossible herein. A few selected topics of general significance, with my comments are presented:

Engineering structures and devices

Almost every change imposed by man on the water resource involves some kind of engineering structure or device. I suppose by far the major portion of the money invested in water resources development is for construction of devices or structures. I think that there is opportunity both for the reduction of the cost of such structures and for improvement in their efficiency through research. In general, engineering devices are too expensive to fully utilize our minor water resources. Since most engineering structures are individually designed, better methods of arriving at functional criteria, improved analysis and design techniques, better materials and improved methods of construction could broaden the scope of what we can afford to do in water resource conservation and development.

Information sensing, telemetering, processing, and interpretation

Compared to systems used in astronautics, for example, the sensing, telemetering and processing of hydrometeorological information is crude and expensive. Measurements of streamflow characteristics such as discharge, sediment transport, pollution quality and temperature, are few in comparison to need. It is almost impossible to make a valid measurement of sediment transport, for example. Meteorological items such as temperature, humidity, wind movement, evaporation, snow cover, and precipitation, are likewise limited. We need to apply modern techniques to increase our efforts in this field so that adequate information for scientific research, for engineering design, and for systems operation, can be collected and interpreted. Digital computers could make possible the use of mathematical models for predicting the effect of natural events and the results of operational decisions in relation to hydrological and meteorological

³ "Symposium on Basic Research in Civil Engineering Fields as Related to Water Resources." Colorado State University, Fort Collins, Colo., June 12-15, 1961.

systems. Analogs likewise could be developed. These techniques have not been exploited extensively in the water resource field.

Hydraulics

Much still needs to be accomplished in hydraulics research. Hydraulics is the basic analytical tool in the development of all engineering devices for handling the flow of water. Better hydraulics means better water engineering. Open channel flow, especially in alluvial materials, needs continued investigation, and is one example of a great many areas of needed research in hydraulics.

Irrigation and drainage

Irrigation and drainage draws on most aspects of engineering and the agricultural sciences. These are synthesized into a system which is in large part socioeconomic in nature. It is unlikely that industrialization in the West will decrease the economic attractiveness of irrigation, although it will doubtless compete for the same water resources. The needs for research in irrigation and drainage are too broad to outline in detail. While the importance of the physical and biological sciences in relation to irrigation problems will continue, increased emphasis will need to be given to economic and institutional aspects of irrigation. I personally am convinced that irrigation agriculture is extremely sensitive to its socioeconomic environment.⁴ I think it may be important to note that, by chance or otherwise, the friendly or neutral underdeveloped nations of South Asia, the Mideast, North Africa, and Latin America lie in climatic zones and possess natural resources such that irrigated agriculture must usually be a very dominant element in their development.

Waste disposal and pollution control

According to estimates made by Wollman⁵ in the Eastern United States, approximately 90 percent of projected flows are required to dilute the projected levels of waste discharge. In five regions of the country projected losses alone (without allowances for waste dilution) will exceed the maximum sustained flow capable of being developed in 1980. Thus, waste disposal plays a very dominant role in our water resources picture. It would seem urgent that every possibility, no matter how farfetched it appears, should be explored to mitigate the effects of the load which waste disposal places on our streams. Areas of investigation which might be considered include:

- (1) Improved treatment processes.
- (2) Accelerated regeneration of stream oxygen.
- (3) Systems of waste transport and disposal which do not require water or use of streams.
- (4) More objective limits on pollution standards.
- (5) Continued reduction of industrial pollution by alternate systems and improved methods.

Some rather "far out" ideas come to mind. For example, if pipeline materials could be developed to which organic wastes would not stick, a system of transporting them by air and disposal by dessication or burning might be developed. For an area which may soon face economic strangulation for want of a water supply, such "high risk" research may not be entirely ridiculous.

Systems engineering

This technique is a process for developing the optimum "system" for particular objectives. The difficulty of analysis of a system increases exponentially with the number of system components which interact. Applications of the techniques of "operations research" to the design of water resource developments could lead to systems which approach optimum use. Systems may have economic and social objectives as well as engineering ones and many likewise include natural elements and people as well as engineering devices.

⁴In a summary article entitled "Agriculture and Urban Life in Early Southwestern Iran," Science, April 1962, vol. 136, No. 3511, Robert M. Adams, associate professor of anthropology, University of Chicago, after reviewing 7,000 years of agricultural prehistory and history of cultures which were highly dependent on water utilization, and at times quite materially successful, cautiously concludes: "But if valid general insights ever can be sought in the history of so small an area, two may be suggested here. The first is that at least the immediate opportunities and impediments to the enhancing of man's economic well-being seem to have lain more often in his social institutions than in the presence or absence of particular items of material equipment." I suspect that times and places may not have changed the implications of Professor Adams' statement, especially where irrigation is an important factor.

⁵Committee Print 32, "Water Resource Activities in the United States," Senate Select Committee on National Water Resources, 1960.

Water demand management

As mentioned by Ackerman^o we usually think in terms of finding a water supply in order to meet specific demands rather than adapting demands to the supply. Improved matching of demands to supplies could lead to reduced investment in water supply works and greater efficiency of utilization to meet our economic objectives. Research is needed to determine the most fortuitous arrangement of demand on a water supply, as well as on incentives which would induce industrial and other users to plan their developments in accordance with such an arrangement.

Ground-water development and management

While some of the statements made herein apply to ground water, research on this resource needs special attention. Improved methods for evaluating ground-water supplies and optimizing systems for development are needed, as are well techniques for utilizing marginal aquifers and better methods of well construction. Artificial recharge needs to be further exploited. Properly planned and operated ground-water development is one of our most promising means of conserving water supplies. Water may be stored underground without subjecting it to evaporation loss and control so that levels are below the reach of roots of uneconomic water-loving plants could save tremendous amounts now transpired in swamps and marshes. Systems analysis might be used to develop plans for such optimum management.

Ground-water resources can be seriously damaged and wasted by improper exploitation; many ground-water basins may be subjected to drafts far in excess of recharge with consequent rapid exhaustion. Research which could lead to the most sensible public policies on ground-water conservation is badly needed.

CONCLUSIONS

I hope that these limited examples of needed research may illustrate the job that is before us. I think that it should be apparent that these examples will be benefited by accelerated research by the States on those problems which are of most significance to them. I believe many of the problems of applied research will have to be attacked item by item, location by location. Water resource development must be closely linked to community and even individual objectives and I believe that State research efforts will greatly assist the States in discharging their responsibilities in planning and development. I believe that duplication can be avoided by the coordination envisioned in the proposed bill, although researchers would avoid this, in any case. There is little professional prestige in duplicating someone else's work.

Bringing the universities into the picture has many advantages besides the production of increased manpower. Universities since World War II have generally demonstrated their capability in administration of research. The interdisciplinary resources of the university should accelerate the progress of basic and interdisciplinary research. In the university, research and teaching work together not only to develop the body of new knowledge; but with the same effort, to spawn the manpower capability which can reduce that new knowledge to common practice.

Senator ANDERSON. Go ahead, Dr. Morgan.

Mr. MORGAN. Senator Anderson, one of our party has to leave at 4 o'clock for a flight to Florida and I am going to put him on out of the order indicated to you earlier.

The president of the University of Florida, J. Wayne Reitz. He will discuss the funding portions of the bill.

STATEMENT OF DR. J. WAYNE REITZ, PRESIDENT, UNIVERSITY OF FLORIDA

Mr. REITZ. Senator Anderson and members of the committee, I wish I were going to Florida, but I am going to Arizona instead, but I am going to get back to Florida tomorrow afternoon.

^o "Water Research Needs," Edward A. Ackerman, Carnegie Institution of Washington. Address before Interstate Conference on Water Problems, Chicago, Ill., Dec. 4, 1962.

I appreciate very much this opportunity to be here with you today. Earlier, Dr. Morgan said that I would speak somewhat on water as an economic resource, as well as the funding provisions of the bill. Because I think the tremendous impact that water has upon our daily lives and the industry, recreation, agriculture and metropolitan areas of this country is obvious to all of us, I am not going to comment on that aspect but rather limit my remarks to a brief summary of views with respect to the funding and fiscal aspects of Senate bill 2.

Senator ANDERSON. Excuse me. Off the record.

(Discussion off the record.)

Senator ANDERSON. On the record.

Mr. REITZ. At the outset I should like to express my appreciation to you, Senator Anderson, and to your colleagues for what I consider to be a carefully evaluated procedure in establishing the funding provisions of this bill. It recognizes, it seems to me, very clearly the needs, the problems, and the desired rate of progress in a water research program.

The first part of the bill, title I, in section 100(a), starts right off by providing specific allocations to the individual States at the rate of \$75,000 the first year and then, of course, to increase by \$12,500 for each of the next 2 years to reach an annual level of \$100,000. This to me is a very important aspect because it satisfies a number of requirements.

In the first place, it will make it possible for any State to immediately, without having to wait for a legislative session, to expand or, in some instances, to perhaps embark upon water resources research. It also very clearly recognizes the variety and complexity of problems that we find among the various States and regions in this country. And further I think it clearly recognizes that widely dispersed programs not only would facilitate research on local as well as regional and national problems, but it will also hasten the training of personnel not only for water management but for the additional needs in water research. And so you have recognized in this initial allocation of funds a very important principle of wide distribution in order to take care of the existing trained resources in water research in this country.

In your opening statement this afternoon, Mr. Chairman, you alluded to the magnificent developments that have taken place in American agriculture as a result of the establishment of the land-grant colleges, and I often stop to think that, if we had not had the insight back in 1862 and particularly in 1887 when the Hatch Act was passed, providing for agricultural research in each of the States, to extend these enterprises to each of the States rather than, as is sometimes done, to concentrate them in a few areas, we probably would not even approach the magnitude of the accomplishments that have been made in the field of agriculture.

And so I commend you highly on this basic philosophical concept.

Then, too, you recognize that within the framework of these land-grant institutions, there is a core of people in the sciences, in agriculture, in engineering, who can bring about an interdisciplinary approach to the solution of problems. These institutions today have broad programs in the social sciences, and many have law schools. For example, in my own State, one of our real problems is developing a better legal framework within which we can govern and administer

certain water programs, and I am sure that this must be the case in certain other States.

Then, if I may refer briefly to title I, section 100(b), here again you have made provision in this bill which permits expanding this research program on an orderly basis in modest annual increments and this, of course, will encourage every State as it sees fit to expand its program through additional allocations and also it will certainly encourage a State to match these funds because this is on a matching basis.

Furthermore, I believe it is highly desirable under section 100(b) that two or more States can join together in developing a program because this recognizes that many problems with respect to water management and water use extend beyond State lines.

Then finally I would like to comment on the realistic approach you have made with respect to the use of these funds. Here again you have provided a real flexibility, very desired flexibility, and it represents a very practical viewpoint in that in these funds which would be allocated to the various States may be used for salaries or expenses, whatever is necessary to promote and foster research in water use and resources.

I believe it is also quite fitting that there is provision whereby these funds may be used for capital outlay, because there will be some States that in order to take advantage of this program, will have to build or alter certain physical facilities. These may be relatively modest, but where this is necessary, I think that some of the initial allocation of these funds for this purpose is highly desirable.

There will be, of course, other States where this may not be so necessary and the full amount can immediately be put into salaries and operating expenses.

If I might just mention title II, section 200, that provides \$5 million, with an increment of \$1 million each year thereafter, for agency contracting, it seems to me that this gives the Secretary of the Interior the desired flexibility in choosing any particular institution, agency, or private firm to do research on water problems which would be within the mission of the Department of Interior.

This, certainly, from a national level—the Federal Government's point of view—provides, it seems to me, the necessary flexibility and the desired flexibility at the same time as section I recognizes so clearly the need to disperse these funds and make use of the talents that do exist in our land-grant institutions.

So, in summary, may I just say that the funding pattern of this bill seems to me to be very clearly conceived.

Furthermore, I believe that, as a starting program over a 5-year period, I would have to say that it is adequate and well timed.

Again, I commend you for the insight you have shown in getting the proper geographic distribution of these funds. And again I emphasize that this program will not only result in findings which will be of great value to the country, but it will also provide an opportunity for training additional people as a byproduct of research. And at the end of 5 years, when the Secretary of the Interior is requested under the terms of the bill to evaluate the program, if this has all been put into effect, as I hope it will be, I have no doubt but that the results will be most encouraging and fruitful for the benefit of this country.

If there are any questions which you would like to ask, I should be most happy to entertain them. I think, though, that with the short time I have used, I will not have to slip away. And I apologize for the fact that I slipped in ahead of President Elkins.

Senator ANDERSON. Thank you very much for that statement.

I am glad you mentioned the fact that we leave a great deal of opportunity for action on the part of these land-grant schools, they can use the funds for salaries, or if they have to use them for facilities, they can do so. That is based on the fact that we have tremendous respect for these land-grant colleges and the way they handle their obligations, and therefore we can give them a great deal of leeway.

There are some people in the water research field that claim they can't find schools to do their research. Will not the basic funds provided for State research centers in section 100(a) help to get schools interested in water research?

Mr. REITZ. I feel very strongly so, Senator Anderson. As a matter of fact, when it is said that we can't get universities to do certain projects in water research, that may presuppose that someone is saying that this may be the specific project on which they put a priority. But if we make these funds and resources available to the land-grant institutions, there is enough talent and imagination to make it possible for these institutions, following the historical pattern, to develop programs in research that will be appropriate to the peculiar and particular problems that are of the greatest importance to the people in the particular areas they serve. I think when we do this, we won't need to worry too much about what the final end product will be from the national point of view.

Senator ANDERSON. I believe that the University of Arizona is probably the only one in the country that has a school of hydrology. I referred to that in an address down at the New Mexico State University, our land-grant college, not very long ago. And someone said, "Well, I didn't even know Arizona had one."

That is right next door to us, and evidently word doesn't get around too fast.

So I am very much encouraged by the remarks you have made today. I think we are making some headway.

While I am on the subject of Arizona's pioneering in hydrology, I would like to attempt to adjust an oversight in our committee print on "Water Resources Research" of September 1962.

The University of Arizona submitted to the committee a bound list of ongoing research projects at the university in May 1962. Unfortunately, the document included extraneous matter and was filed with exhibits which had been included by some other universities, including several research reports, school catalogs and brochures. It was not submitted to Mr. Theodore Schad for his analysis of research in various fields underway in the country, and it did not appear in the body of the committee print.

Without objection, I shall make the report of the University of Arizona as of January 1963; an appendix to this hearing.

The report is very interesting beyond the information contained in the project descriptions, statements of progress and similar data. It shows that water related research is being done in the university's departments of agricultural chemistry and soils, economics, engineer-

ing, agronomy, anthropology, atmospheric physics, chemical engineering, civil engineering, geochronology, geology, hydrology, horticulture, tree ring research, water utilization, and watershed management.

It is a demonstration of the multidisciplinary character of water research which reaches beyond the single field of hydrology. It shows the possibilities of enlisting a good many competent scientists in related fields to work on water problems through S. 2 programs.

Oklahoma State University has requested amending their report on water research in a letter advising that their earlier report, which appeared in the September 1962 committee print, was incomplete.

Without objection, we will include the Oklahoma State material as exhibit 2.

Dr. Elkins?

STATEMENT OF DR. WILSON H. ELKINS, PRESIDENT, UNIVERSITY OF MARYLAND

Mr. ELKINS. Senator Anderson and members of the committee, I thought, when I left your part of the country, perhaps there wouldn't be any water problem when I came to Maryland. But I found that there was still a water problem, and there continues to be, and will continue to be.

However, in response to your earlier remark about football at El Paso, I have to admit that my fortunes in football in Maryland have not been such that any of our opponents are eager for me to leave.

I am pleased to have this opportunity to support enthusiastically Senate bill 2, because I believe that it will accomplish within a reasonable period of time some of the things that have been accomplished in the area of agriculture and agricultural research.

There seems to be, I am sure, a unanimous and strong feeling on the part of all who have spoken today, and also from the extensive studies that have been made in this field, that there is a great need for a tremendous amount of research to be done which has not been done in the past. In order to do this research, we need to find more manpower than we have had in the past. We need this manpower to do research management, and also, I hope, for some teaching in this area. And with the increasing population of the country and the vast uses of water at the present time, the demand is going to increase very rapidly.

We have a relatively small number of people trained specifically in water resources. We have a much larger number—many of whom, I think, have not been identified—who have competence in some aspect of this broad field.

There are a number of agencies at the national level, and there is an expanding number of agencies at the State level and at the local level, who are interested in this important subject. But when they get into the matter themselves, a lack of basic information and a lack of personnel is a serious deterrent to any real progress.

One of the main questions in connection with manpower is that of where do we get the personnel to do the research at the present time. And I think that this manpower is available, as has been indicated previously, in our land-grant colleges and universities. Water research is a subject which requires an interdisciplinary approach.

And there are many individuals within various disciplines in the land-grant colleges who have some competence to do research in this field. By bringing them together in a center such as has been provided in this bill, I think that we will provide a much larger group of people that can do substantial and worthwhile research.

When the Hatch Act was passed in 1887 providing for the agricultural experiment stations, there weren't people available to do the work in just specifically the area of agriculture. They had to draw upon the sciences and other fields to find people to do this kind of work. But in time they got a large number of people involved in it, and they also provided a number of people as they went along with the research program and with the teaching program in the land-grant colleges and State universities.

In order to attract these people and to focus attention upon the importance of water resources, we are going to have to generate some interest, we are going to have to induce people to come into this field and to work particularly in the field. And in order to do this, practically all—I suppose all—of the States will need additional financial support. In my own institution, there are a number of people engaged in some aspect of water-resources conservation and other areas of water research. But we do not have a sufficient amount of money to point this up and to get the kind of information that is really needed to have a substantial impact upon this problem.

In addition, as has been indicated, as we go into the research field in considerably more depth, I think that we will train a number of young graduate students who will be attracted to the field. I am hopeful that in this way—and I think we have reason to believe in this way—there will be added to the number of personnel a rather large group of people who are not now attracted to the field of water resources because there hasn't been sufficient attention focused upon the field. But if you find a professor in a particular area who is competent, he is going to have graduate students who will work with him. And these graduate students, in time, of course will be competent to do the work themselves and will add to the manpower that is needed.

On the problem of Federal support, while I think most of the States are spending money in this field in some way or another at the present time, the public universities are hard pressed to do everything that needs to be done, particularly at the national level. As you well know, and everyone knows, we are faced today with an increasing number—a rapidly increasing number—of students, so that it is difficult for the States to appropriate a sufficient amount of money to take care of the number of undergraduates. It is going to be even more difficult for the States to do so in the next decade. Unless we can get financial support, as we have gotten financial support, as you know, in the area of defense, to do research work, the universities and colleges are simply not going to have the finances to take care of the needed water resources research. I know from observation and from talking with people in some of the institutions that have established centers that, although they are making progress and find that the field is promising, they simply do not have sufficient funds to carry out their research to the extent that they would like to carry it on and to accomplish the results that are desired.

By having it in all of the land-grant colleges or State universities, or in every State, you are going to be able to take advantage of the talent that you find all over the country. I think this is much more advantageous and much more productive in the long run than having it in a few centers where you would not attract nearly so many people who are already in the colleges and who, of course, would have to move if they did this work. It is going to bring together the faculties, or some of the faculties, from the various disciplines; and, in time, and in the not too distant future, in my opinion, you are going to find a very substantial product coming from the centers that may be established in these various areas. You are going to find that the number of people who are interested in it will increase and that we will train as we go along with this program a great many new people also.

Thank you very much, Senator.

(The prepared statement of Mr. Elkins is as follows:)

STATEMENT OF DR. WILSON H. ELKINS, PRESIDENT, UNIVERSITY OF MARYLAND
NATIONAL MANPOWER DEVELOPMENT

Manpower in the water resource field

There seem to be no truly accurate estimates of the present number of people trained in the water resources field or of the numbers of such people that may be required in the future. In 1960, approximately 800 scientists reported an hydrologic specialty to the National Register of Scientific and Technical Personnel, and an additional 2,500 reported some professional competence in one of the hydrologic categories. It is important to note that 65 percent of those reporting hydrology as their major field of competence are employed by the Federal Government while only 6 percent are associated with educational institutions.

In spite of the absence of more specific estimates of individuals now engaged in some aspect of water resources and of those needed in the future, it is evident from many sources, for example the Summary Report of the Select Committee on National Water Resources that the demand for qualified individuals presently exceeds the supply and that additional manpower in substantial quantities will be required for inventory, research, development, planning, management, regulation, and conservation of this resource. Manpower will be required for research, planning and control at all echelons of government. In addition, many private industries will need the services of water resource specialists.

Agencies in need of water resource specialists may include the following:

National level:

U.S. Department of the Interior:

Bureau of Reclamation.

Geological Survey.

Water Resource Research Service.

U.S. Department of Agriculture:

Agricultural Research Service.

Cooperative State Experiment Station Service.

Federal Extension Service.

Soil Conservation Service.

Forest Service.

Department of Defense:

Corps of Engineers, U.S. Army.

Civil Engineers Corps, U.S. Navy.

Department of Commerce: Small Business Bureau.

Health, Education, and Welfare.

AID and Peace Corps, consultants and technicians.

Executive department: Scientific advisers.

National Science Foundation.

State level:

Executive department.
 Planning department.
 Economic development commission.
 Roads commission.
 Geological survey.
 Water pollution control department.
 Forests and parks department.
 Game and inland fish department.
 Health department.
 Agricultural extension service.
 Agricultural experiment station.
 State board of agriculture.
 State soil conservation committee.

Local level:

Planning and zoning commissions.
 County health department.
 County roads.
 Water and sanitary commissions.

In the State of Maryland, the Governor has recently appointed a commission to study the conservation, coordination, and planning for the development of natural resources. The State planning department has contracted for research related to water resource problems, supply, utilization, and future potentialities. The State economic development commission, the pollution control commission, State health department, State department of geology, mines, and water resources, and other State agencies are involved in some phase of water resources. The lack of much more basic information and education is a serious deterrent to progress.

Teaching of water resource science

The inventory, development, management and conservation of water resources requires applications of the biological, physical, earth and social sciences. If one asks the question: "Where are teachers who discuss water resource conservation?" it may be answered: "Everywhere, even in the elementary schools." If, however, we ask where water resource science is being taught in sufficient depth or concentration to provide informed manpower and leadership for the future, it would be necessary to say, "Only in a very limited number of institutions of higher education."

"Scientific Hydrology," published in June 1962 by the Federal Council for Science and Technology, presents specific data relative to the teaching of hydrology and to the entire water resources problem. One of the pertinent facts to be noted is the statement that only 4 percent of the 881 hydrologists reporting to the National Register of Scientific and Technical Personnel indicated teaching as their work activity. To quote the report: "It is this tiny fraction upon whom we are dependent for training additional hydrologists to meet the tremendous growth and development in the field of water resources." This report indicates that while 73 of 128 engineering institutions provided a basic undergraduate course in hydrology, and 42 offered a basic graduate level course, only 29 institutions offered one or more courses in special phases of hydrology beyond the basic course.

The need for research and advanced study in the field is indicated by the fact that only 5 percent of the hydrologists listed have a graduate degree. In contrast, 15 percent of the earth scientists and 35 percent of all scientists have the doctor's degree. Again to quote the report: "* * * in an age of increasing knowledge and specialization, advanced study is absolutely essential if the science is to meet its responsibilities."

It is only fair to point out, however, that most hydrologists with bachelor's degrees have taken courses in fluid mechanics, hydraulics, soil mechanics, soil physics, geology, mathematics, and physics, thus providing a foundation upon which they can grow professionally. In the area of agricultural engineering, courses are offered which are directly related to soil and water resources. Curricula in the plant sciences include basic courses in soils, soil-moisture-plant relationships and conservation. In many subjects, including economics, geology, geography, meteorology, oceanography, civil engineering, and others, some undergraduate work is offered relating to water resources, but there is relatively little advanced study. There are a number of programs dealing with the broad area

of natural resources, such as that found in the Natural Resources Institute of the University of Maryland, but these programs do not provide the information nor the personnel to cope with the complex problems of water resources utilization.

The preceding comments may be summarized very briefly and succinctly. In our colleges and universities we have many who are involved in research or teaching of some aspect of water resources science. Yet, there are few institutions where the "whole cloth is put together" and the subject treated in the depth required to provide leaders of the future. The threads with which to weave the cloth exist in our land-grant colleges and State universities, but there remains the task of weaving the threads into the desired pattern. In order to do this there is need for Federal encouragement and support.

The institute approach to meeting manpower and research needs

As an example of the institute approach to meeting manpower and research needs, Cornell University has established a multidisciplinary water resources center. This program enables the doctoral or masters candidate to gain a comprehensive understanding of water resources at the same time he pursues the primary work in his major field. Fellowships and assistantships are offered to encourage interest. This joint educational enterprise in interdisciplinary instruction and research brings together faculty from the departments of agricultural economics, agricultural engineering, agronomy, conservation, economics, geology, hydraulics, regional planning, and sanitary engineering. The program, one of limited number in the country, is evidence of what can be accomplished in our land-grant institutions and State universities.

The need for knowledge and the need for trained manpower in the field of water resources today might well be compared with needs in the field of agriculture at the time of the passage of the Hatch Act in 1887 which provided for the establishment of the agricultural experiment stations. Men from the natural sciences were employed as professors of agriculture in order to meet the teaching and research needs of that day. The development of knowledge since that time has led to a high degree of specialization, to the training of adequate numbers of scientists and teachers, and to the production of an abundance of food supplies to meet our ever-increasing needs.

Establishment of a water resources institute in each State, as proposed in Senate bill 2, can provide the nucleus and the impetus for development of knowledge and trained manpower in the water resources field. The institute approach makes possible the bringing together of interested faculty from different disciplines to guide the development of graduate students and research in water resources. At the same time, this approach avoids the dangers of withdrawing scientists from fields in which they are currently needed. It also provides opportunity for these scientists to better understand the broad problems in the water resources area and opportunity to direct their research efforts toward the solution of these problems.

Justification for Federal assistance

Land-grant colleges, State universities, and private institutions have generally been unable to finance interdisciplinary sciences except for specific situations of limited scope. While future needs are recognized, the pressures to expand facilities to meet the basic demands for undergraduate education are placing an ever increasing burden on the States. In fact, these pressures are such that the probability of obtaining sufficient State funds to undertake and develop a substantial and meaningful effort in the interdisciplinary area of water resources is not promising.

With further reference to the Hatch Act of 1887, and the resulting agricultural experiment stations, a tradition has developed of interdepartmental research and cooperation related to farm problems. With this record of achievement as a precedent, it seems reasonable to assume that water resources research and manpower development could follow a somewhat similar route. Enactment of enabling legislation and appropriation of Federal funds as outlined in Senate bill 2 now under consideration would lay the foundation. As in the case of the agricultural experiment stations, the proposed institutes in each State, while permitting study of local problems, would produce knowledge from research of significance to the States and to the Nation as a whole.

The welfare of the individual, the economic growth of the Nation, and the security of all of the people will depend on how well we know and manage our

water resources. To do the job that is required, more education and research directed toward water resources are essential to the development of enough manpower and the accumulation of sufficient knowledge to assure the Nation of an abundance of water.

Senator ANDERSON. I am glad to hear what you said about increases in enrollment, and so forth. You know our State well enough so that you can appreciate this. I was having a discussion with a very prominent educator and trying to point out to him that the enrollment in all of our universities is going to increase. If they had, for example, the 16,000 students now, I pointed out that they were going to have about 35,000 by 1980.

He said, "You must be insane."

And I said, "You're the one that is insane; you aren't doing anything about it."

They are going to have them, and they ought to be making accommodations for them.

In addition to accommodating students, there is scholarly work to be done. But the States can't just reach out and do all these things, because they already have uses for more money than they can get.

So I am very glad to have your statement.

Dr. Aldrich?

**STATEMENT OF DANIEL G. ALDRICH, CHANCELLOR, UNIVERSITY
OF CALIFORNIA, IRVINE CAMPUS, BERKELEY**

Mr. ALDRICH. Senator Anderson and members of the committee, it is my privilege to comment this afternoon about the water resources research that has been conducted by a State deeply concerned with water resources and development, and a State that, through its State land-grant institutions, has attempted to produce some of the research information so important to the development of a water resource program.

I will indicate that in addition to my responsibility as university dean of agriculture and chancellor of a new campus of the University of California, I also come here as a chairman of the coordinating board of the water resources center of the University of California. I have been asked by Mr. Morgan to comment on how we view the provisions of the Anderson bill insofar as development of water resources research in this country is concerned.

As a background for my comments, I think it is appropriate to draw attention to the fact that the arid States of this Nation have long been concerned about water resource development. Within a day of the time Brigham Young arrived in Salt Lake City in 1847, they were diverting the water from City Creek for agricultural purposes. Within 8 months of the time that California was admitted as a State to this Union, efforts were being made to modify the long existing common water law which established riparian rights and which even through court action permitted the wastage of water established on such basis. And as early as 1880 tremendous effort was being made by the State engineers of California to modify the law so as to permit maximum utilization of water resources development in that State.

These, of course, were pointed at the problems associated with agriculture. But I would note that as early as 1900 the city of Los Angeles was aware that the surface water provided by the Los Angeles River

and the underground water supplies of the South Coastal Basin were not sufficient to meet the domestic and industrial needs of that city, and set in motion the building of facilities to bring water 250 miles to that city.

Simultaneously the city of San Francisco, recognizing the inadequacies of the water supplies of that area, laid plans to bring water from the Hetch-Hetchy project in the Tuolumne River country some 140 miles to San Francisco.

By 1930, even though water was being transported 250 miles to Los Angeles from the Owens River Valley, Los Angeles recognized that still there were inadequate water supplies for the development of that area, and formed the Metropolitan Water District, which resulted in a project bringing Colorado River water 247 miles to that city.

I point out that during this period, starting in late 1900's, and as late as 1956, when California reviewed its entire water plans and set in motion a master plan for water research development, the price of delivery of water ranged from less than \$1 an acre-foot to projections as high as \$80 an acre-foot today.

Certainly the increase in cost of water and the monumental works that are necessary to transport water from one area of production to an area of use have set in motion problems which only research in the social sciences, the physical sciences, the biological sciences, in the political and in the legal aspects, will produce the information necessary to solve.

Traditionally, research on water relates primarily to the identification of supplies, their quality and the efficiency of application.

Today it is a far more sophisticated and complex requirement that faces not only our State but also the Nation. And disciplines which heretofore have never concerned themselves with water development or resource development—those other than engineering and agriculture—must now concern themselves with it if the problems are to be solved.

And so I move from this background commentary to a comment on the impact of the Anderson bill as we view it upon our State and a water resources research center already in motion, because it was apparent in 1956 to the State of California that the magnificent contributions of the agricultural experiment station to the agricultural uses of water, as well as the occasional contribution from our colleges of engineering about the impounding of water or the production of works for the transport of water, the pumping and distributing of it, were really inadequate for the job ahead. It was a piecemeal effort, it was a case of too little and too late.

As a consequence, Senator Collier in California introduced a bill which provided \$100,000 for the establishment within the University of California of a water resources research center. And this center today, as a consequence of providing the university in the State of California with a research arm that may coordinate existing researches within this institution and may stimulate researches in areas heretofore never explored, has actually set in motion an additional \$400,000 from the State of California, so that today in excess of a half million dollars of State funds are made available to the water resources center of the university for research.

But I would point out that this is an entirely inadequate amount. Because of the complexity and sophistication of research required in

water research development today, there is tremendous talent, not only in our land-grant institution, but in every land-grant institution in this country, that is going untapped because of the inadequacy of funds to stimulate these people—to encourage these people to devote their talents to water resource development.

So we look upon the provisions of the Anderson bill as providing the catalyst that will set in motion talent that is already at hand.

I would say without reservation that there exists within the land-grant institutions of this country today, every one of them, talent that is not yet exploited. In fact, no State as I view it has the money to exploit the brains presently on the staffs of our land-grant institutions.

And so in answer to the comment raised by Senator McGovern concerning the \$100,000 that might be provided to each State, I would simply say that, in many instances, that money would just go a little way toward providing the resources to enable this brainpower already assembled there to go into motion.

I would then comment upon the impact of this bill as we view it upon a State that has not yet set in motion such a research center, or which is presently contemplating a master plan for water resource development. Anything that we have said about California could be said about a State that hasn't even begun such development. For certainly, as I view the water problems, we find there support for the old adage, you never miss the water until the well runs dry. And I point out that even though we are very much involved in our own State, we are really 20 years too late, because the works that are being set in motion now in California require an intensity of information which 5 years more research might provide the answer to, but for which today decisions must be made.

As a consequence, I am grateful for the opportunity for States not yet concerned in developing their water resources to be stimulated by the moneys provided through this bill to set in motion prior planning, so that they will not be in the situation of too little too late.

I would also like to comment about the level at which the program set in motion by this bill is to be administered within the Department of Interior should be conducted. Water resource development is of national concern. It involves concern as to defense, health, commerce, agriculture. And certainly as we focus the attention of many agencies upon water development, we cannot submerge the administration or the coordination or the correlation of problems related to water research within some small agency, or some minor bureau. It must have the top level concern of certainly a Secretary or Under Secretary. This is too important a matter to be submerged.

I therefore would conclude with a commentary upon what I view to be the importance of the relationship, the cooperative relationship that must be set in motion between Federal agencies and the State agencies, as, for example, land-grant institutions.

The magnificent contribution of the agricultural experiment stations and their associated extension services to the advance of technology in American agriculture we understand and appreciate.

As a consequence of the relationship established between the agricultural experimental stations and the Federal Government, the U.S. Department of Agriculture, there has been the opportunity for exchange of information between those generating new information and

applying it at the State level, as well as among those who are generating it and applying it at the national level. It is a two-way street.

The exchange of information moves from the States to the national level, and similarly from a national level to those operating and applying information in the States.

I think the provision in Senate bill 2 that provides for the collection of information is an exceedingly important facet of it, if the States and the Nation are to do the job of water resource development which we believe must be done.

Thank you.

(The prepared statement of Mr. Aldrich is as follows:)

PREPARED STATEMENT OF D. G. ALDRICH, JR., UNIVERSITY DEAN OF AGRICULTURE,
UNIVERSITY OF CALIFORNIA

I. WHAT A STATE THAT IS CONCERNED ABOUT ITS WATER RESOURCES HAS DONE IN
PLANNING AND DEVELOPING THEM

Most of the States in the arid West have taken the initiative in the development of their water resources. The early pioneers were realists and fully appreciated the vital importance of the development of water supplies. Within a day after the arrival of Brigham Young in the Salt Lake Valley in 1847 water was diverted from City Creek for the purpose of irrigation. California took steps to plan for development of its water resources 8 months before its admission to the Union.

In all the arid States development of water resources was hamstrung by centuries of common law which had firmly established riparian rights, including the court approved right to waste water urgently needed elsewhere. In California as in other States, firm actions were taken to break with this crippling tradition. By 1880 the State engineer was engaged in an assessment of the water resources of the State of California and was pressing for carefully coordinated planning for their development. In 1887, the Wright Irrigation Districts Act broke the monopoly of riparian rights and, as amended, provided the impetus to the growth of locally developed irrigation enterprises.

Nor was the phenomenal growth of irrigated agriculture the sole force in water resources development. By 1900 the city of Los Angeles had outgrown the water supply provided by the combined above ground and subsurface flow of the Los Angeles River. In 1905 the voters approved a daring engineering proposal to build a 250-mile aqueduct to bring relief to a water rationed community. San Francisco, facing similar problems approved its Hetch-Hetchy aqueduct system to the Tuolumne River in Yosemite at about the same time. By 1930 the demand for water in southern California had outstripped even the most liberal estimates and, by means of a State enabling act, these communities were joined in a metropolitan water district, now serving cities from San Diego to Ventura.

Regional planning in California came to a head in 1930 with the first California water plan. A bond sale to finance the first phase of this project was authorized. Because of the depression years the bonds failed to sell and the project was constructed by the Federal Government as the Central Valley project.

Most recently, under an up-dated California water plan, the voters of the State authorized the Feathers River project carrying water to the productive but arid southern San Joaquin Valley and to the south coastal districts.

Although the pace of economic development in California has resulted in greater development than has occurred with her neighbors, a similar story can be told for the other States of the arid West.

California's research in water resources, like that of her neighbors, was first directed to the identification of supplies and needs. As the more readily available resources were exhausted it was necessary to turn to alternative more costly projects and to take steps to determine more accurately the duty of water and to provide for more efficient use. The colleges of the University of California, particularly engineering and agriculture, devoted considerable time and attention to these problems. Because of the impact of the Hatch Act the latter moved with exceptional efficiency toward the solution of those problems related to the use of water for agricultural purposes including the effects of water quality.

By 1955 it was apparent that for the guidance of water resources development in California, this piecemeal approach to water resources research in the university was both too little, too late and somewhat less than well coordinated. With a budget of \$100,000 from State funds provided by the Collier bill a coordinated research program was initiated by the University of California in 1956. This evolved in 1956 into the Water Resources Center. Responsibility for saline water conversion research conducted by the university's colleges of engineering since 1952 was assigned to the center in 1958.

The water resources center has been quite successful in stimulating appropriate research and suggesting the recasting of other studies. It has provided research funds with a minimum diversion of the attention of the research staff. It enjoys excellent cooperation with all departments of the university. The center conducts its research through these departments, providing a medium for interdisciplinary discussions. It complements rather than replaces the current research of the departments and has permitted undertaking important investigations which otherwise would not be feasible. In many cases the combined resources of the center have attracted extramural funds, increasing the total effectiveness.

The center has also served as a focal point for the dissemination of research results to and from other universities throughout the country and to the State department of water resources. It currently has a mailing list of 265 libraries, important individuals, and local, State and Federal agencies.

II. WHAT EFFECT WOULD A FEDERAL SOURCE OF FUNDS FOR RESEARCH, SUCH AS THOSE PROVIDED IN THE ANDERSON BILL, HAVE ON SUCH A STATE?

There are some important ideas which have developed in the last few decades which have altered the nature of water resource research. Unappropriated water has become increasingly scarce, the quality poorer, and the cost of its development correspondingly more expensive. Water in the Turlock and Modesto Irrigation Districts of California has a cost less than a dollar per acre-foot. The Los Angeles Aqueduct delivered its first water at a cost of \$6.10 per acre-foot. Current cost of Colorado River water to the metropolitan water district, including current taxes, is about \$40 per acre-foot. The Feather River project will deliver water at a cost variously estimated from \$60 to \$80 per acre-foot. These developments have occurred at approximately 30-year intervals and each has come barely in time to alleviate a serious water shortage.

These steadily rising costs and progressively more monumental projects puts an even greater burden on research, both to reduce their cost to a minimum and to solve the geometrically increasing number of problems associated with more intensive development.

Furthermore, the nature of the research problems has changed materially. Emphasis in California is now on regional and interbasin aspects of water resources. Political and economic questions associated with long-distance transfers of water have been raised. A far greater number of alternative elements of the plans for regional development must be considered. These accentuate the cry for more and more accurate information in all aspects of water resources, physical, social, and economic.

No individual university today can be expected to finance all the research required by that State's water resources development. The research that it does conduct, however, will accrue to the benefit of other States and to the Federal agencies. If adequate attention is to be given to the important research problems which face all of the United States with a greater or lesser urgency, more work must be encouraged and a considerable degree of national coordination provided.

Federal financial assistance as provided in Senate bill 2 should serve as the catalyst for stimulating the additional research which is vitally needed. The water resources service should provide a focal point for nationwide coordination of all water resources research, supplementing the research program where necessary with contracts and grants.

One of the most important features of the financial support to the water resources institutes is the efficiency with which those funds can be directed to productive investigations. As a conservative estimate at least 20 percent of the research time of the university staff is used to prepare contract and grant proposals to a variety of sources of funds and to prepare interim progress reports to each source. The water resources institutes, if the experience of the

water resources center can be taken as a guide, will substantially reduce this encroachment on productive research without loss of financial control or necessary administrative supervision. Additionally the long unproductive timelag which now often exists between the formulation of good research proposals and their ultimate funding can be virtually eliminated. The most critical element in water resources research other than funds is qualified principal investigators. Their time must be used most effectively. Because the water resources institutes will be quite familiar with the capabilities of the research staff a minimum diversion from productive research will be required in order to assess fully the contributions to be expected, and their importance to the overall problems of water resources development. The result will be more effective utilization of research staff for research.

III. WHAT EFFECT WOULD SUCH FUNDS HAVE ON A STATE WHICH HAS NOT BEGUN PLANNING AND DEVELOPMENT OF ITS RESOURCES?

Water problems have the habit of proving the truth of the adage, "You never miss the water till the well runs dry."

Those States which have only begun resources planning are often aware for the first time of the urgency of their problems. The need for research, historically, has not been apparent until the time when all the attention of the community must be directed to the solution of a critical problem.

Despite the success of the water resources center of the University of California, it is painfully evident that such a research unit should have been organized at least two decades ago. In order to meet demands for water in 1970, concrete must be poured today. Firm decisions have been required even though it was evident that 5 years' additional research could have made a material difference on costs, pricing, and financial feasibility.

States whose water resources planning has just begun may profit from this experience. The Anderson bill will provide the incentive for those States to move promptly on the research questions which must be resolved by the time the moment of final decision arrives. It also provides for improved coordination by which these States may make use of the research contributions already made which have applicability to their problems. Equally important to the United States is the welcome increment to water resources research provided by the staff of universities in these States toward the resolution of problems in other sections of the Nation.

IV. DESCRIBE HOW THE HATCH ACT HAS BENEFITED AGRICULTURE IN EACH STATE WITHOUT PLACING LIMITATIONS BECAUSE OF FEDERAL ORIGINS OF FUNDS

Experience with the Hatch Act, which provides similar Federal support for agricultural research, demonstrates the effectiveness of the form of support proposed in Senate bill 2.

In most other instances, where there is a multiple source of funds for a research project, there has resulted considerable inefficiency. The request for funds itself has to be directed to many potential sources in order to obtain support from a few. Each request must be phrased differently in light of the specific objectives of the potential source. More often than not the response is several grants or contracts each small in amount. Often each contract will require a specific localized objective. This procedure results in a very substantial portion of the principal investigator's time spent in the quest for funds for his research and in diversionary studies of less general importance. Such is the normal situation for much of the research in departments of engineering across the Nation.

In contrast to this agricultural research departments, because of the Hatch Act, have been able to devote most of their research talent to the problems of research rather than in seeking support. Minor objectives of special groups can still be accomplished through grants and contracts but the Hatch Act has given these departments the ability to pursue an integrated program of research, well coordinated nationally, without limit or restriction because of source of funds other than that of basic policy and the mutually complementary objectives of State and Federal Government.

The combined financial resources of State and Federal Government have permitted a broader scope of research activity. Long-range projects, ordinarily infeasible with local or special interest financial support, have been undertaken.

Modern equipment has assured first-class research information in place of a crude experiment and an extrapolation.

The research staff members, under the Hatch Act, are quite unaffected by the particular combination of State and Federal support accorded his research. Other than being fully aware and appreciative of the sources of funds and the effectiveness of this combination, he is free to pursue his research in the objective manner which is a prerequisite for accurate and useful results.

Nor does it appear from the experience of the water resources center of the University of California that any problem will arise with both Anderson bill funds and Hatch Act funds provided to the same center or institute. Support by the center for water resources research in the agricultural departments of the university complements the support provided from State and Hatch Act funds. It has not diminished previous support from these sources nor has it detracted from other important programs in agricultural research.

There has resulted greatly increased coordination between the research of the agricultural departments and other departments of the various campuses of the university. There has also resulted a greater appreciation of the complex inter-relationships which exist and a corresponding trend toward water resources research and agricultural research in this broader context.

V. COMMENT ON THE NEED FOR THIS PROGRAM TO BE ADMINISTERED AT SECRETARY OR UNDER SECRETARY LEVEL

To be fully effective, this program should be administered at the Under Secretary level. It is imperative that the research program should be broad. It is even more imperative that it be dynamic. This virtually precludes a routine assignment of its administration as a collateral responsibility of any one bureau or office.

The modern multiple use concept is vital to optimum development of water resources. At the same time, multiple use also implies multiple conflict of interest between many of these users to a greater or lesser extent.

Under these circumstances, it is obvious that no one of these multiple users should be given a research advantage over any other if long-range water planning is to serve equitably all the parties involved. For this reason alone administration at the Under Secretary level would appear to be a necessary condition for the ultimate success of this plan.

High-level attention is important from another point of view. The water resources research program must be dynamic and responsive to the needs of the Nation. It must reflect matters in many other areas of the national interest including virtually every other secretarial department and executive office. National defense, health, education, international relations, commerce, and agriculture, to mention a few, have inseparable interests in the water resources research program. To fractionate the research effort among these departments would destroy the very purpose of the act. To bury it deep in any one department would be equally destructive.

VI. COMMENT ON THE NEED FOR TOTAL PROGRAM DEVELOPMENT IN WATER RESOURCES TO BE A COOPERATIVE ONE BETWEEN STATES AND THE WATER RESEARCH SERVICE

Just as the need for cooperation and coordination at high levels of the Federal Government is essential to the success of the administration of this program, so the need for a truly cooperative relationship between the water research service and the States is vital to the execution of the program. This must be based on a mutual understanding of the strengths and modus operandi of each.

State and privately supported universities provide a unique assembly of research staff of highest competence for both fundamental and applied research. Long experience has demonstrated that this assembly makes its greatest contributions when it is governed only at the policy and objective level. More detailed instructions for the guidance of the work, allocation of funds to the specific studies and similar controls should be the responsibility of the director of the water resources institute and its governing body. These persons are in the best position to assess both the need for research in a given area, the capabilities and limitations of its research staff and facilities in that area, and the extent to which more detailed guidance will be necessary.

Responsibility for nationwide coordination must rest jointly on the water resources institute and the Federal Government. Where necessary research is required in an area not adequately covered by the water resources institute,

the water research service must be in a position to fill the gap through direct grants or contracts with any qualified research group willing to undertake the study. At the same time, care must be taken that indiscriminate contracting for the services of the same research staff required for the water resources institutes' programs does not work to the disadvantage of the national interests.

Nor is the policy and objective guidance a one-way street. The research staff and the administrative officers of the water resources institutes, through direct contact with those intimately concerned with specific problems and through their own independent status, are often in an excellent position to evaluate research needs and their priorities in an objective manner with first-hand information. The water resources institutes must be given an adequate voice in the development of a long-range water resources research program. This voice must be that of a cooperative partner if, through research, both State and National interests in the optimum development and preservation of our water resources are to become a reality.

Senator ANDERSON. I am deeply indebted to you personally for that very fine statement. I think it is excellent, and I am delighted to have it.

I am also happy that you state that the State which I understand now claims to be first in population, certainly one of the very first in riches, realizes the importance of doing this on a nationwide basis, giving other States not so fortunate as California an opportunity to participate and get their study and planning done in good time. You have done a fine thing in the research study you have made, and given a great stimulation to the rest of us.

Dr. Morgan, I want to state before we start questions that I appreciate very much the way the land-grant colleges have responded to this invitation to testify. They have come in with a concerted program and have taken various phases of this subject and presented it to us. I think it is very helpful. And you have built a very fine case in preparation for action by this committee. I thank you individually and on behalf of the committee for this presentation this afternoon.

Are there questions?

Senator Burdick?

Senator BURDICK. I would like to ask this of the gentleman from California. The question might be asked by someone, Why do we diffuse and spread our money throughout the several States rather than put our funds in one central agency of some kind to make an intensive study?

Mr. ALDRICH. I want to be clear about your question, sir. Why do we propose to spread it rather than concentrate it?

My immediate answer, sir, is that genius is where you find it. And I feel that there is no State in this Union or no region in this country that has a corner on brains. One can only look to the tremendous contribution that agriculture has made through a program in which each of the States has participated and to which each of the States in its own way has contributed—to the generation of those minds and those abilities that take their place in producing information, be it for agriculture or for water resources.

I feel that it is a great mistake to think about concentrating the talent in one location. First, there is no individual as far as I am concerned who can defend the statement that that is best. Further, I feel that providing the catalyst that sets in motion the creative ability of people gathered in the 50 States will enable us to get further ahead. I would simply use the example in my own institution. I know that

the contribution that the University of California has made to the State and to the Nation is much greater for having had a campus at Davis, a campus at Berkeley, a campus at Riverside, and a campus at Los Angeles, rather than if there had been a single campus at one location.

Senator BURDICK. I agree with you completely, but I wanted the record to show it.

Senator ANDERSON. Look at all the good football we would have missed.

Senator BURDICK. One more question.

Is there some apparatus that universities have between them to exchange information?

Mr. ALDRICH. Yes, there is. I would go back to the arrangement which we have in agriculture. As a consequence of regional projects, as a consequence of a national organization such as the Association of State Universities and Land-Grant Colleges, in which there is a division of agriculture, a division of engineering, and a graduate division, there is provided annually and periodically during each year opportunity for people with common concerns and responsibilities to get together to share information about what they are doing in their researches in order specifically to minimize unnecessary duplication of effort, to minimize the possibility of fishing in dry ponds, or moving down blind alleys. And certainly, as is noted in this bill, that there shall be collected together at one point all of the works that go on related to water resource development, I feel that with that mechanism one sets in motion the opportunity for exchanging information, coordinating and correlating research efforts, and minimizing the problem of unnecessary and uneconomical duplication.

Senator BURDICK. Thank you, Doctor. And I would like to thank all members of the panel for their contribution today.

Senator ANDERSON. Senator Dominick?

Senator DOMINICK. I would like to ask Mr. Aldrich a question, and maybe Dr. Peterson.

What is the principal area of research that you think should be concentrated on at the present time?

Mr. ALDRICH. Do you wish for me to respond to that, Senator Dominick, in terms of the national interest, or in terms of local interest?

Senator DOMINICK. What I am asking for is what you think is the most important single area in connection with water that should be concentrated on?

Mr. ALDRICH. Certainly we must devote every talent that we have to insure an adequacy of water supply. And there are many approaches to achieving an adequacy of supply, be it for agricultural use, industrial use, domestic use, or what have you. There is the modification of unsuitable waters, as for example, the desalinization of brackish waters, which may be accomplished at a lower cost than the desalinization of seawater. There is a tremendous effort being made to devise inexpensive energy sources to bring about this improvement of water quality, particularly where dissolved solids are the problem.

I would also point out that we are approaching this matter of providing an adequacy of supply by also moving into water reuse

in which are involved the problems of virus transmission, the problems of disease transmission, be they bacteria, fungi, or viruses of any nature. There is also the matter of toxicity, because of certain toxic elements being introduced into water in some place or another. We are very much involved in the development of techniques that will permit water reuse and therefore greater efficiency of water usage.

But then these comments relate specifically to techniques for insuring the adequacy of supplies. One of the great problems that we face today in this country is assuring that where the water exists in adequate supply it can be transported to the point of great usage. And so in my own State, for example—and I am quite sure that this occurs in other parts of the country, too—the problem that faces us is that two-thirds of the water falls on one-third of the State, and that two-thirds of the usage occurs in the one-third where the water does not fall.

And so a complex problem confronts us. It is one of political institutions, of social institutions, and the economic requirements that will permit us to get our water at one point and deliver it at another point and yet provide all citizens with an appropriate right to water, not causing one segment of the population to suffer economically in order to provide for the other.

So my answer obviously is a multiple answer. I cannot confine my comment to just one area, since they are all interrelated.

Senator DOMINICK. Thank you.

Senator ANDERSON. One final question as far as I am concerned, Dr. Morgan.

There has been some criticism that the bill doesn't provide adequate oversight and regulation of research in the States. Would it be a mistake to have excessive Federal supervision of the State programs, in your opinion? I just worry when I have somebody who says, well, let us regulate all the State programs. I think that might be exceedingly dangerous.

Mr. MORGAN. Certainly the States recognize that the people of the country through their Federal Government are entitled to be assured that funds made available by the Congress to States will be put to good use. But when we embark upon an objective such as the broad one outlined in the Anderson bill, the wisdom of Solomon is hardly enough, even if it could be concentrated in one place, to direct the really productive use of these funds. As Dr. Aldrich has said, genius is where you find it. Our bank account of professional competence in this country, our national stockpile of talent, talent capable of that unusual capacity to generate brandnew ideas, something that hasn't been thought of, which is the fountain spring of productive research—that talent is scattered all over.

And this bank account—I might use this analogy—is in deposits all over the country. A very great deal of it is deposited in the staffs of these colleges and universities who would, with the funding available under this bill, be able to trigger their talent, turn it loose, set it loose in finding through the generation of new ideas solutions, to some of the problems that confront us in this area.

Some of this inquiry would be very basic in nature. At the other extreme, some of the inquiry would be very practical in nature, that is to say, applied to the solution of observable problems. And to

imagine that creativity involved in this national fund of scientific talent and professional competence would flourish under conditions of distant control is to imagine something that just won't happen.

Senator ANDERSON. Dr. Aldrich seems to be anxious to say something on that.

Mr. ALDRICH. I would simply like to augment Dr. Morgan's comments about the role of an educational institution.

Really, even with the collection of scientists and minds that are found in these institutions, one must not for 1 minute minimize the importance of the stimulation that comes from some young man or young woman sitting before you and questioning what you as an experienced citizen claimed to be fact. There is no agency on earth that is subject to the rigors of examination, the testing of ideas, that our educational institutions are. And this bill which provides for the support of research on water resources in a land-grant college, in an educational institution, takes on its stature, as far as I am concerned, because it permits young minds to share in this experience of pushing back the frontiers of knowledge. This is the stimulation that comes only in an educational institution, and no master organization of senior scientists will ever accomplish it. They do not reproduce their kind. Only an educational institution has the capability of testing, being tested, and reproducing young people.

Senator ANDERSON. Dr. Morgan?

Mr. MORGAN. Mr. Chairman, the concluding statement that I will file with your committee discusses some of the public aspects of water quality and recreation and navigation and flood control, river system planning, economic growth, and so on.

(The concluding statement of Mr. Morgan follows:)

CONCLUDING STATEMENT PRESENTED BY WILLIAM E. MORGAN, PRESIDENT, COLORADO STATE UNIVERSITY, AND CHAIRMAN, WATER RESOURCES COMMITTEE, ASSOCIATION OF STATE UNIVERSITIES AND LAND-GRANT COLLEGES

WATER AS A PUBLIC RESOURCE

1. *Why invest in research on a broad and diversified basis?*

Gentlemen, you have heard why we think this bill will open the door to eventual solution of many of the Nation's problems presently associated with water use and development. I shall not attempt to summarize these points. Rather, I would like to bring to your attention reasons which call for public support and investment in research on a broad and diversified basis. We are all aware of the manifold financial decisions facing the Congress as well as other levels of government. Yet, the expenditures contemplated under this bill must be classed with those which are directly an investment in the future productivity of our economy.

To what extent will such investment be made by the private sector, and to what extent is technological progress and the solving of serious problems of water allocation a public responsibility? A few activities will be carried on by private enterprise as has been noted previously, and State and local governments will attack some specialized problems. But the basic and fundamental solution calls for research effort that extends beyond the normal range of immediate interest or beyond the funding capabilities of these units.

The contribution urgently needed at the present time is a contribution of knowledge. When this is available, other agencies will have many tasks to perform. By providing this system for financing research, public support is not supplanting the efforts of others; rather, it enables others to expand their efforts and lessens the risk of failure as they undertake their own research. This way of doing things is the essence of our heritage of economic and political organization. The productivity increases which have ensued from the agricul-

tural experiment station system indicate the creative potential from this type of partnership organization and effort between central and local governments.

Water is a public resource. A phrase to the effect that the water in a State is the property of the people, or that water is owned by the people or the public, is not uncommon in State constitutions. Public rules have been defined which permit private rights to water use, but the very nature of the resource has resulted in a continued public interest.

2. Water quality

Let us look for a moment at one of the most vexing current problems which is destined to become more troublesome in the future, namely, the quality of our available water. These questions are important in all of our major river systems. In an earlier time, individual users, whether farm, industry, or municipality, gave scant attention to these problems. However, today's increased pressure on water use has greatly changed this situation. Urban wastes contaminate other urban uses. Irrigation return flow inhibits future agricultural use. The degradation of ground water imposes a limitation upon other users today as well as in the future. In many of these situations, intergovernmental relationships are very significant, including municipality, State, and international.

Two of the crucial questions at this point are technological and economic with the legal and organizational problems being closely associated. Since an individual user seldom suffers the effects of his own pollution but shifts them to the downstream users, public responsibility has been widely recognized by the establishment of minimum standards for effluent. The tendency has been to shift the incidence of the cost, at least in part, back upon the original user.

At this point we are brought face to face with the technical-economic issue. Does the user have available technical means to improve the quality of his effluent and not be forced to price himself out of the market? The public can make the rules and organize the enforcement of the criteria. We need research to provide the technology and to improve the rulemaking structure itself. The responsibility to see that the basic scientific information is available which farmer, industry, municipality, and Federal agency can adapt to their particular situations and interests is widespread and continuing in nature. The results that flow from research made possible by Senate bill 2 can be a major factor in organizing the orderly and economic disposal of wastes not only by stimulating research but by making readily available within each State a center from which scientific information can flow to farmers, industries, municipalities, and others who have need of it. All State universities are experienced not only in research but in the communication of scientific information to those who need it through extension education program both formal and informal, through seminars, workshops, publications, and so on.

3. Recreation

Quality limitations have been important to many fields of water use, both old and new. A use which is not new but which has been expanding rapidly is recreation. This is important from the high mountain trout streams, down to reservoirs and lakes, along the rivers to the ocean estuaries and seaside beaches. Need I do more than assert the common observation that water attracts people from the crowded metropolitan park to the wilderness area?

Quality is also important in this case—quality of recreational enjoyment. Our ability to judge and assess these characteristics is extremely crude to say the least. Some recreational activities enter into the commercial market, yet major factors with respect to water based recreation are not market oriented. The investment which provides them is often a public investment, and public rules and regulations control the activities on the water. The issues seem clear that the problems ensuing from the increased pressure of recreational use are public issues.

Let me just suggest some of the questions which are relevant. To what extent and in what fashion can part of the costs of public recreational investment be repaid by the users and still provide recreational opportunities on a wide enough basis to satisfy our criteria of democratic equity? This is not a simple problem and will need more concentrated research effort than is presently being devoted to it. What are the best criteria for deciding upon sites for recreational investment? To what extent are various recreational water uses competitive with each and with other uses? If the uses are mutually exclusive,

by what criteria can we allocate the water; or, if they are complimentary, how can we organize uses to yield an optimum benefit? These are just a few questions of a policy nature which urgently need answers based upon sound research.

And again, they are problems which confront State and local governments as well as the Federal Government. Indeed, the Outdoor Recreation Resources Review Commission describes the States and State and local areas as key in meeting recreational demands. Every State and many communities will be confronted with problems of best allocation and management of complimentary uses of specific waters to serve recreational needs.

4. Recreation uses illustrate again the need for multidiscipline research

You may wonder that I have not mentioned any of the technological problems within this area—problems associated with wildlife and watershed management in particular. My not delineating these does not mean that I do not recognize their importance—just the contrary. They are also fundamental, but to handle the issues noted above we would need prior or concurrent knowledge in natural science fields. It is this relationship between the social and natural sciences which I want to emphasize. The two fields are highly interdependent, and research needs in both fields are equally overlapping and intermingled. The organizational structure contemplated in this bill is designed to advance research efforts which will coordinate social and natural sciences as they attack our water problems. I call your attention specifically to the provision which establishes the research centers as an all university organization.

5. Navigation

No consideration of the public aspects of water can overlook one of the oldest public concerns, navigation on our major waterways. That we have such a long history in dealing with this facet does not mean all of the problems have been solved, as you are well aware. Important technical considerations concerning the maintenance and development of these channels is needed. And this function should be thoroughly integrated into the overall program of research into stream and channel management. Another essential ingredient is to relate through research this water use to other modes of transportation. Public accountability would demand no less. In this way we can expect these waterways to make their optimal contribution.

6. Flood control

Research into channel problems is not limited to navigation but relates to another of the long-recognized public responsibilities; namely, flood control. Specialized research has been going forward, but channel conditions are dynamic and present new problems as system development progresses. And as noted in previous instances, research in the area of the physical sciences should be coordinated with research into flood plain planning and development. We have examples of programs which are progressing, but the problems we face are larger and more diverse. Through a research program such as contemplated in this bill, the potential economies to be realized in flood control action programs of local, State, and Federal agencies are incalculable.

7. River system planning

Much of what has been said suggests the important idea that river system planning has been another major public responsibility. The basic research contemplated here will provide a firmer foundation for this planning—will provide better knowledge and techniques for this purpose. For example, many years ago the Congress provided for public planning for the use of hydroelectric sites. We still have the public responsibility to use the resources to make the best contribution to our economy.

As the navigation, we have a public trust to develop the technology along with the integration of hydropower development with that from other fuel sources. Our power system a half century from now either will benefit or suffer from what we do today. The research initiated today will alleviate today's problems, but another of its lasting dividends will be the contribution it makes to building our economy of tomorrow.

8. Economic growth

The importance of municipal and industrial development to our future economic growth hardly needs stating. This growth obviously is dependent upon a multitude of factors other than water supply.

Reasonably priced water in adequate quantity and quality will not insure the economic growth of a region, but without it many of today's thriving communities would have been bypassed. Others face a precarious future solely on the basis of their situation with respect to water supply. No one can guarantee that this bill will furnish the answer to their salvation, but no proposal offers more hope for proper guidance in the effort these communities will put forth to survive.

At the risk of being repetitious, I again point out that community water problems will vary with each community and that S. 2 admirably meets the need for a wide geographic spread of water science centers to serve such localized requirements for information and guidance.

9. Legal, administrative, and organizational aspects of water management

There are also legal and political uncertainties which are of major importance. Water law is at the same time both rigid and changing. These characteristics certainly are not without their value, but their force should act as a spur to let our best research knowledge help guide the direction of change.

Similarly, one of the most baffling tasks we face is that of organizing water management and development. Our political economy of water is complex; water is a production requisite universally employed by direct utilization; indirectly it touches every facet of our economy in exceedingly complicated financial and power relationships. The service to be rendered by public research into public organization should hardly have to be argued.

10. Theoretical and practical; basic and applied

Universal rules are hard to come by. Adaptation to solution of the problems of the moment is equally important. This bill will permit—will bring about—both a firmer understanding of the universal rules as well as application to particular situations. It provides the means, the organization and the incentive to tap the creative talents of the whole range of diversified brainpower available on university campuses and in the laboratories of America. It will stimulate both practical and basic research. It will provide the nucleus for training the experts—the hydroscientists—who are already greatly needed and who will be needed in increasing numbers as water problems become increasingly critical to increasing numbers of towns, States, and regions as well as to the Nation itself.

Before all of us now in this room will have passed on, this bill, if enacted, will have taken its place along with the Morrill Act, the Hatch Act, and the Smith-Lever Act as another monumental contribution to the structure of basic legislation that promotes the common good in America.

Mr. MORGAN. I would like to just mention one of those as illustrative of the answer that I am trying to give you.

In this area of recreation, in which there obviously is a very great public interest, we get into the area of intangible values. As we bring into sharp focus research related to resource use in part for recreational purposes, we bring into play the natural scientist, the social scientist, we bring into play the legal and the organizational specialists in our society, all of these people working in team fashion on a given problem. This to me illustrates the wisdom of allowing great freedom to the researcher on the end of the pipeline, where the work is being done, to let his imagination run and let his curiosity be put to effective use. There just isn't the wisdom available on this earth to give intense direction and supervision to this kind of creative activity. You talk about the President's office on the university campus in the same terminology that you talk about the executive department of the Federal Government. These people need a lot of loose rein in which to roam.

Senator ANDERSON. I couldn't help recalling while Dr. Aldrich was speaking that I once was privileged to have a discussion with Dr. Ernest Lawrence. And he got down to the fact that both of us had come from South Dakota, which of course gave us a common background. And I pointed out at that time that more U.S. Senators had

been born in South Dakota than any other State in the Union, five of them as against three in the next State. We got to talking about genius being where you find it. There was a farm machinery supply house in a little town in South Dakota, and they kept the spare parts in boxes from 1 to 10 stacked from the floor to the ceiling. At the end of the year representatives of the harvester company would come around and count what was left in the boxes, and they would settle on that basis. They would take everything out of the boxes and count it and then put it all back in again. This young clerk thought that that was a wasteful process, a time-consuming process. So he invented a sectional bookcase and sectional filing cabinets to keep account of parts more readily. He did that in a little town in South Dakota that had no contacts with major business management at all. And Mr. Wernecke did very well with his invention.

Again I say that that is the way things come about. They don't all come out of the great centers of business, they don't all come out of the Federal Government. They don't all come from centers of excellence. Many of them come from students who have ideas and who clash with the professors. They come from widely scattered sources.

I am glad to have you answer. States should not be left free to make mistakes in spending this sum, \$100,000 a year, but they should not be hamstrung.

Do you have anything additional?

Mr. MORGAN. I would like to make one concluding statement. The colleges in the land-grant system feel that before we who are in this room today pass on, assuming that we live out our normal life expectancies, that before then, if this bill is enacted, it will take its place along with the Morrill Act and the Hatch Act and the Smith-Lever Act as a monumental contribution to the structure of basic legislation that promotes the common good in this country.

Senator ANDERSON. If it should, the land-grant colleges will have a great deal of credit for it.

Any questions?

(No response.)

Senator ANDERSON. Mr. Bailey, of Auburn University, is here. And we will ask him to come up. You folks may stay here as long as you wish, because I enjoy having this fine battery that we have had before us this afternoon.

STATEMENT OF W. S. BAILEY, ASSOCIATE DEAN, GRADUATE SCHOOL, AND COORDINATOR OF RESEARCH, AUBURN UNIVERSITY

Mr. BAILEY. I am W. S. Bailey, associate dean of the graduate school and coordinator of research, Auburn University, Alabama's land-grant college.

This opportunity to express our enthusiastic approval of and support for the water resources research act is sincerely appreciated.

I should like to speak to many of the important and strong features of the bill under consideration, but the effective presentation of President Morgan and the other representatives of our association makes this unnecessary, and the lack of time prohibits it. Therefore I will merely mention the activity currently underway in Alabama which indicates the importance which we attach to this problem in a State

with abundant water resources but with limited financial resources for the task at hand.

There is being prepared at the present time legislation to be introduced in the forthcoming special session of the State legislature providing for the establishment of a water resources research institute at Auburn University, and for an appropriation of \$100,000 for its support. We are hopeful that S. 2 will receive favorable action in the near future. And at the same time we are convinced of the importance and the need for our modest local program, and are working for its activation at the earliest possible date.

Thank you.

Senator ANDERSON. Thank you very much.

Dr. Morgan, before you go, I want to say this: You have a good organization scattered around the country. I just hope you will continue to keep interested in this bill. And if suggestions come to you as to ways in which it might be improved, I hope you will let us hear your suggestions and ideas. We don't intend to close our minds on this. We will use every opportunity to profit by your suggestions. And that goes for Auburn University and any other institution in these hearings.

We have a fine letter of endorsement of S. 2 from President Eric Walker of Pennsylvania State University. He is a member of the President's Science Advisory Committee which is studying availability of scientists. We will include it in the record at this point.

(The letter referred to follows:)

THE PENNSYLVANIA STATE UNIVERSITY,
University Park, Pa., February 20, 1963.

Senator CLINTON P. ANDERSON,
*New Senate Office Building,
Washington, D.C.*

DEAR SENATOR ANDERSON: The Pennsylvania State University has followed with great interest the progress of S. 3579 introduced by you in the 87th Congress and S. 2 recently introduced by you in the 88th Congress.

The projection outlined by the report of the Senate select committee that by the year 2000—namely, that 90 percent of the surface water in the Northeast would be required for pollution abatement—is startling.

Scientists at the Pennsylvania State University for some time have been aware that the passage of detergents through sewage disposal plants without being completely destroyed is creating hazards in streams and other water supplies receiving effluents from such plants.

With only a limited volume of water being available to dilute the increasing volume of waste from an expanding population and industrial complex, and in order to stop and reverse the increasingly serious pollution of our water resources, more research is urgently needed on new methods of disposal on non-aqueous sites. At the Pennsylvania State University a large-scale interdisciplinary research program is now underway on the reconversion and conservation of sewage effluent. Approximately a quarter of a million dollars of university funds have been expended on this to date as our zoologists, foresters, bacteriologists, agronomists, sanitary engineers, and geologists are cooperating to find answers to the problems of waste waters. In addition, a land and water resources research institute has recently been established at Penn State to stimulate, expedite, and coordinate research programs dealing with these resources.

The Pennsylvania State University stands ready to support your efforts in behalf of this legislation and is prepared to implement the provisions of such a bill without delay. If we can be of any assistance in encouraging the passage of Senate bill S. 2 in the 88th Congress please do not hesitate to call upon us.

Sincerely yours,

ERIC A. WALKER, *President.*

Senator ANDERSON. Our meeting tomorrow will be at 10 o'clock. I won't be able to attend. Dr. Jerome Weisner, Director of the Office of Science and Technology, and Science Adviser to the President, will be the first witness. I invite any of you who wish to come back tomorrow. And if you get additional ideas during this hearing later, we would be glad to have them.

I thank all of you for being here.

(Whereupon, at 4:05 p.m., the hearings was in recess, to reconvene at 10 a.m., Wednesday, February 20, 1963.)

WATER RESOURCES RESEARCH ACT

WEDNESDAY, FEBRUARY 20, 1963

U.S. SENATE,
COMMITTEE ON INTERIOR AND INSULAR AFFAIRS,
Washington, D.C.

The subcommittee met, pursuant to recess, at 10 a.m., in room 3110, New Senate Office Building, Senator Clinton P. Anderson presiding.

Present: Senators Anderson, Jackson, Moss, Burdick, McGovern, Nelson, Allott, and Jordan of Idaho.

Senator ANDERSON. The committee will come to order. Senator Hruska, of Nebraska, has a statement. We will hear from him now.

STATEMENT OF HON. ROMAN L. HRUSKA, A U.S. SENATOR FROM THE STATE OF NEBRASKA

Senator HRUSKA. Mr. Chairman, I thank the committee for the opportunity to appear before you in support of S. 2 and to commend the chairman, Senator Anderson, for his leadership in authoring this important bill and in pressing for early hearing this session. The committee is to be commended for its support toward the goal of enactment.

Earlier this week, I spoke at some length on the floor of the Senate on behalf of this bill. I understand that my remarks there were made a part of the record of this hearing at the instance of the chairman, for which I thank him.

I would, however, Mr. Chairman, like to restate the major points I stressed yesterday.

First, the report of the Senate Select Committee on National Water Resources makes it abundantly clear that America is rapidly approaching the point at which water shortages in vast areas will constitute a significant barrier to our overall economic and social progress.

Second, the time for action is now. Some kind of start must be made and this bill is a significant step in the right direction.

Third, however publicized and thoroughly studied any recommendation may be, a proposal to implement it legislatively must conform to the standard of political acceptance. In this regard, we have "witnessed" within the past 2 years a stalemate between those who believe that State water rights are paramount to Federal rights and those who hold the opposite view. Necessarily a common ground of agreement must first exist.

Fourth, happily, there is contained in the bill before us an approach which avoids the bitter struggle and probably hopeless strife as to paramount water rights. I refer to the Hatch Act of 1887 which created the Nation's agricultural experiment stations. These stations

over the past 75 years have operated under Federal and State cooperation with eminent success.

Fifth, I wish to make it clear, Mr. Chairman, that the Senator from Nebraska prefers to await the precise language of proposed legislation to implement the first two recommendations of the select committee regarding the Federal role in water resource development before commenting thereon. But this reservation in no way applies to S. 2. It is a good bill and it should be passed.

Finally, Mr. Chairman, I wish to emphasize how essential water conservation is to my own State of Nebraska. We are proud of the accomplishments and determined to expand our efforts but we realize that much remains to be done.

The establishment of a water resources research center at the University of Nebraska would be of great benefit in helping to find both long-term and short-run solutions to our water problems as it would in other States throughout the Nation.

Mr. Chairman, this bill up to this point has drawn heavily upon the structure and record of the State experiment stations through the Department of Agriculture. As one deeply interested in its success, I express the hope that there will be frequent reference to the history and workings of the State experiment stations. Frequent consultation in that regard will be very helpful indeed.

While the subject bill is one that is full of promise and potential, there are many caution signals which present themselves for consideration at the very outset. No doubt, most of them have already been covered by the testimony of witnesses heard. Notably, they would pertain to duplication of research effort by other agencies or bodies both governmental and nongovernmental, the need for coordination of research effort to avoid duplication and recognizing gaps that need to be filled, the necessity to guard against disruptive competition for the relatively limited supply of scientists and engineers in this field, and the necessity for suitable and adequate library services. This latter would include provision for data and information on water resources research and investigation projects to serve as a source of information from which catalog and the library could be compiled and maintained.

In more recent times, it has been my good fortune, through my service on the Agriculture Appropriations Subcommittee, to have considered these aspects of the agricultural research effort through the State experiment stations and generally. Although I should hesitate to speak on the subject in view of this committee chairman's greater knowledge and ability in that field, I venture to do so in the hope that what remarks and suggestions I make might prove of some value in the planning of the Department of Interior for this water resources research center system.

The State experiment stations program has proved to be primarily one of service. Of course, there is responsibility in the Department for seeing that the funds are spent as intended by the Congress. However, there is the further responsibility of making available technical assistance which it is called upon to give. That assistance includes comprehensive reviews of Federal-grant research, regional research, and coordination of research effort among the States as well as between the States and Department.

We were told within the past year that records of some 12,000 Federal-grant and State-supported projects are maintained by the State

Experiment Stations Division. Research summaries which indicate the nature of the studies made and material on the projects supported are published biennially. It is through such means as these broad review and coordinating services that it is sought to avoid duplication of effort and planned to carry out a more effective Federal-State program and recognize gaps that need to be filled by taking suitable and timely steps.

It might be of interest, Mr. Chairman, to note that the library services in the Department of Agriculture, through the National Agricultural Library, currently carry an appropriation of a little over \$1 million. Constant effort is made to improve the general bibliography, to provide necessary specialized individual services to scientists by supplying material from the literature; and to select, acquire, and preserve suitable publications. All of these things and many more will be encountered and similar services contemplated by those called upon to implement the subject bill.

Of course, the Office of Science and Technology as reconstituted only 2 years ago will be of great help in this regard.

Even here, however, we see there is continuing effort to improve procedures. It was with gratification that we witnessed introduction by the Senator from Arkansas, Mr. McClellan, of a bill last week calling for the establishment of a Commission on Science and Technology. Its purpose is to strengthen Federal programs in the fields of science and technology and to avoid duplication and overlapping between Federal departments and agencies engaged in scientific and technological research. With the recollection that eight major Federal agencies are now engaged in water research work, all of us can be impressed by the utter necessity of laying especial emphasis upon these goals. The Hoover Commission approach proposed by the Senator from Arkansas will help immensely.

However numerous or apparently perplexing these details of organization might be, the fact remains that water resources research institute is solid in concept. It will be fruitful in great degree in the training and development of additional scientific personnel; in the wide dissemination of the results of its work in speedy effective fashion; and because of its decentralized functioning, it will be capable of producing results calculated to deal with peculiar characteristics of the water uses storage and distribution problems which might inhere in various localities and, therefore, can best be dealt with by intensive effort in such locality.

Again I say, the chairman of this committee and the committee itself are to be commended for the leadership they have shown in drafting this bill and pursuing its enactment into law.

Senator ANDERSON. I appreciate your kindness, Senator, your able statement and the very vigorous support you are giving this bill.

The committee is honored this morning by the appearance of Dr. Jerome B. Wiesner, Director of the Office of Science and Technology, and the President's scientific adviser, who has evidently given a great deal of thought to this situation, because he has written some very fine comments on it.

Dr. Wiesner, all of us are tremendously interested in this subject. And your appearance here today personally is a matter of gratifica-

tion to Senator Jackson and myself, and I am sure the other Senators as well.

We will be pleased to hear your comments.

STATEMENT OF DR. JEROME B. WIESNER, DIRECTOR, OFFICE OF SCIENCE AND TECHNOLOGY, AND SCIENCE ADVISER TO THE PRESIDENT OF THE UNITED STATES

Dr. WIESNER. Thank you, Senator Anderson.

I am pleased to appear before your committee to discuss S. 2, a bill to stimulate water research in colleges and universities, and to promote a more adequate national program of water research. First, let me emphasize my agreement with the assumptions underlying this bill: that the water resources problems facing the Nation are of such scope and complexity as to justify immediate steps to broaden and strengthen research on those problems; that there is need to encourage research on water resources problems of State and regional significance; that there is need to expand research and inquiry into the fundamental physical, biological, and social aspects of water resources; and that there is need to enlist and increase combined efforts of scientists, engineers, economists and other scholars for research and graduate education in the several disciplines underlying water resources.

The nature and importance of research in water resources has been amply detailed in the excellent reports by your committee and by recent comprehensive studies within the executive branch of the Government.

Although this country is blessed with an abundance of water in nature, variations in geographical distribution and the rapid expansion of our population and industry have combined to pose mounting problems of availability of water of adequate quality. Consequently, the development of water resources has become one of the largest single activities in the United States. Water resources development, encompassing all sectors of society, presently involves an expenditure of about \$10 billion every year, and the rate is rapidly increasing.

A small fraction of this annual investment devoted to research aimed at better understanding of the many complex ways water enters into man's environment could provide enormous economic benefits. Research needs range from basic research on the nature of water to research in the social sciences in relation to water management. Some of the problems are of national character; others are of State or regional interest. If we are to make adequate headway in anticipating and ameliorating water shortages—and by this I mean high-cost water, because you can always get water if you pay a high enough price—it is necessary to develop and mobilize the scientific and technical capabilities of our research institutions, Federal and State; public and private.

The importance of research in natural resources was underscored by the President in his messages to the Congress on natural resources in February 1961 and on conservation in February 1962. In the former message, he called on the National Academy of Sciences to undertake a broadly based study and evaluation of the present state

of research underlying the conservation, development, and use of natural resources.

The report of the National Academy of Sciences has been completed and is being followed up in the Federal Council for Science and Technology. It includes a study of water resources which emphasizes the need to increase research efforts on selected aspects of water resources and calls for urgent consideration of interdisciplinary training of personnel capable of planning and executing effective research programs in this field.

In the same message, the President directed his science adviser and the Federal Council for Science and Technology to review ongoing Federal research activities in the field of natural resources and to determine ways to strengthen the total Government research effort relating to natural resources.

The Federal Council has underway a broad study of research in natural resources being conducted and planned by Government departments and agencies. It established a Special Task Group on Coordinated Water Resources Research under the leadership of Dr. Roger Revelle, science adviser to the Secretary of the Interior. The task group was asked—

- (1) to formulate, in as broad terms as possible, the applied problems in water management and control which are part of the missions of different Federal departments and independent agencies, and which require research and development to enable them to carry out their responsibilities more effectively;

- (2) to prepare inventories of present research and development programs, including both basic and applied research, within each department and independent agency in terms of their relevance to these applied problems;

- (3) to develop the considerations that should determine policy and that will influence choices among policy alternatives regarding an expanded program including both intramural and extramural activities;

- (4) to compile, on the basis of planned fiscal year 1964 budgets, a proposed national program of water resources research and development for fiscal year 1964;

- (5) to identify points of agreement and disagreement between different departments and agencies concerning responsibilities for water resources research and development; and

- (6) to suggest policy framework of any new legislation and mechanisms for further interagency coordination.

The report of the task group was endorsed by the Federal Council with minor qualifications and on Monday of this week was transmitted by the President to the Speaker of the House and the President of the Senate for consideration in connection with the budget request for fiscal year 1964 and the need for new legislation.

The task group report for the first time presents a comprehensive inventory of ongoing research in water resources within the Federal Government and research planned for fiscal year 1964. The work of both the academy and the Federal Council on water resources research was taken into consideration in the administration's budget request for fiscal year 1964 which calls for significant expansion of research effort in this field. The report sets forth certain guidelines

for new legislation required to strengthen the Federal programs in water resources research to which I invite your attention in connection with the consideration of S. 2. These guidelines are amply backed up in the report by extensive discussion of the research, manpower, policy, and organizational needs for strengthening the water resources research capabilities of the Nation.

New legislation is needed to strengthen the contributions that universities can make to research and graduate education in water resources. In my view, such legislation should be consistent with the following principles:

(1) All Federal agencies concerned with water resources should have the authority and funds to contract with and make grants to any universities, whether or not they are the location of water research centers.

(2) It is desirable to develop additional centers of water resources research in many universities and to strengthen existing centers and programs. There is special need for research and analysis that draws on the combined talents of scientists, engineers, social scientists, economists, lawyers, and others. There is also a need at local levels for technical analyses and studies to apply the findings of research. The centers should draw on the diverse scientific, technical and other skills throughout the schools and departments of the university or college. The character of Federal support for such centers should avoid excessive orientation of research to the mission of the particular Federal agency providing financial support and should encourage research directed at State, regional, or national water resources problems. In order to meet this objective, some Federal support to each center is required on a continuing and university-planned basis and should complement the extramural research grants programs of the Federal agencies in support of their separate missions. S. 2 wisely recognizes that the form of organization of these research centers should be determined by the institution itself, since the objective should be to strengthen competence where it resides in the university and to bring it into focus on water resources problems through arrangements that fit the organizational pattern and development plans of the educational institution.

(3) Support to the water resources research centers should be in part on the basis of a relatively small formula amount to a designated research institution in the State to permit it to establish or strengthen its capacity for the conduct of water resources research, and in part on a matching-fund basis for support of research at the center, giving careful consideration to the potential of the institution to conduct research of high quality. The Federal Council for Science and Technology expressed the view that the establishment of water resources research or analysis centers in the States with Federal grants should be on a permissive basis, under explicit qualification of standards. I feel that legislation should emphasize the creation of such centers on a State or regional basis, depending on the availability of qualified personnel and the desirability of establishing centers on a regional basis, where cooperative effort among States would better utilize available scarce personnel and more effectively bring them to bear on problems of mutual interest. In other words, one shouldn't insist that centers be established on the basis

of States. Also, the administrator of the grants program should have clear authority to decide whether or not Federal funds should be used, on the basis of the capabilities or potential of the research or analysis center to do high quality work.

(4) Although new legislation should give to one agency the administrative responsibilities for carrying out the formula and grant programs, the legislation should in no way supersede authorities presently vested in other agencies to conduct extramural research in the colleges and universities. In the administration of matching grants for the conduct of research, the administrative agency seeking appropriations for this purpose should evaluate the proposals for grants in close consultation with the other agencies having substantive interest in the field of water resources. The other agencies should participate in the drawing up of rules and regulations and criteria for evaluation of research support.

I recognize the need, from the standpoint of prudent management, to designate a single executive agency such as the Department of the Interior for the administration of a national program of the type envisaged in S. 2, but I am also aware of the historical and legislative development of the interests and missions of other major Federal departments and agencies in water resources research. The bill recognizes the coordinate interests of other agencies and would not place the Department of the Interior in a controlling position. However, I would like to emphasize that, in carrying out the provisions of this act with respect to the support of universitywide water resources research centers, the Department of the Interior should, in effect, serve as an executive agent in furthering the interests of all of the agencies in their common objective of strengthening the water resources research capabilities of the Nation.

The continuing leadership for interagency coordination and for securing interagency agreement on the national water resources research program will be provided through the Office of Science and Technology and the Federal Council for Science and Technology. With the passage of Reorganization Plan No. 2 in the last session of the Congress—with which Senator Jackson is familiar—the Office of Science and Technology was given responsibilities for assisting the President in the coordination of Federal science programs. Working closely with the Federal Council for Science and Technology, my Office provides the focal point for encouraging and bringing about such coordination. A coordinating committee on water resources research is being established under the Federal Council for Science and Technology, and serious consideration is being given to the creation of a high caliber analytical staff for support of the work of the Council in developing a coordinated water resources research program. The Federal Council, with the assistance of a committee on water resources research, will make assignments of technical leadership responsibilities for given segments of the water research effort to particular agencies in order to develop a well-conceived water research program that conserves and strengthens the supply of qualified scientists and engineers, and that is sufficiently strong in depth to serve the broad scope of national needs and interests in water resources.

The effectiveness of interagency coordination of research in water resources and of the management and conduct of agency research

requires an adequate Government-wide scientific and technical information system to serve the needs of program administrators as well as working scientists and engineers. Although I am in sympathy with the objectives expressed in S. 2 to maintain a current catalog of water resources research and investigation projects in progress or scheduled by Federal agencies, I feel that it would not be wise to provide for this in legislation. Water resources research is but one of a number of important areas of research activity that require a current inventory of ongoing efforts, only one of a very large number. The Federal Council for Science and Technology has the matter of scientific and technical information, including this problem, under study, but has not yet determined the organizational arrangements that could best serve the purposes intended in S. 2. For example, the Science Information Exchange, supported on an interagency basis at the Smithsonian Institution, has responsibility for maintaining an inventory of current research in the physical and biological sciences. Possibly this activity should be broadened to embrace water resources research so that it can be properly related to other research efforts supported by the Government. In fact, I would suppose that much of the water research activity is supported there. I would much prefer to see the handling of this problem left to the discretion of the administration which, I can assure you, will work expeditiously to arrive at a solution that will meet the objectives of the bill.

In conclusion, I would like to emphasize the considerable importance of strengthening the in-house competence of Federal laboratories engaged in the conduct of water resources research. Although I recognize that the bill under consideration is directed at the support of research and related graduate training in educational institutions, we should keep in mind that in some areas of water resources research a major part of the scientific and technical competence in the field resides within the Federal research establishments. We must strive to upgrade the competence and level of effort in both the Government laboratories and the universities if we are to achieve the objectives of the bill to promote a more adequate national program of water research.

Senator JACKSON (presiding). Dr. Wiesner, I want to thank you for a very fine statement.

I was particularly interested in your comments regarding the coordination within the executive branch of the various agencies already engaged in this field. I take it that a coordinating committee is being established—has it been established?

Dr. WIESNER. We are in the process of establishing it. And, as I said, we are also in the process of doing one additional thing, and that is exploring how to put together a permanent information group, because one thing I believe the staff of this committee found in its studies and that we found in preparing this report which we forwarded to you was that it was extremely difficult to find in the Government Establishment and in the institutions that we support outside the Federal Establishment just precisely what is going on and what progress is being made and how it interrelates to the other activities of other agencies. And we believe that the most important single step in proving the integration of the research activities in

the Government is to provide ourselves with a considerably better quality and quantity of information regarding research.

Now, just exactly how we will do this we don't know, for the reason that we find this problem in several fields, not only in the water resources field. And I am still uncertain as to whether one should handle each of these independently, at least temporarily while we experiment, or whether we should do it on a broader base.

Senator JACKSON. There are certainly quite a number of agencies now involved in the water research program. If a good job is to be done in connection with the provisions of this bill, of course, we have to be carefully coordinated first at the Federal level in order that the right programs are undertaken in the various States through the assistance to colleges of higher learning; do you agree on that?

Dr. WIESNER. I think that the one thing which stood out in the minds of the panel is that there is a great shortage of people to do the research you are talking about, and that is why we feel that S. 2 is so important a step in strengthening the water research activities in this country. I think it is extremely important, though, that this does lead to a higher quality and larger output.

Senator JACKSON. So that we don't waste talent.

Dr. WIESNER. Yes. And that is why we feel that the agency which goes forward with this program should have a considerable amount of discretion and not be required by law to automatically place a center in the State—as I say, there may be areas in the country where it would be desirable to have the program handled on a regional basis, though on an educational basis it is probably true the more centers we are able to create the better off the country would be.

Senator JACKSON. Senator Allott.

Senator ALLOTT. I wonder, Dr. Wiesner, just how much will be done toward coordinating this. I think, generally speaking, probably that in this whole field the various Western universities, and what we used to call agricultural colleges but which have since graduated into something else, they have probably done more work in this area than the schools of the East, because the pressure has never been, up to the moment, on the Midwest or the Eastern States for this development.

Looking into the future, I am a little concerned that if this proposed bill should become a law, that almost every land-grant college and a lot of universities would be in here with all sorts of projects, some of which work has probably been accomplished and done by some of our schools in this country many, many years ago. Do you think this department of yours could keep this straightened out and stop this sort of worthless duplication.

Dr. WIESNER. Well, I wouldn't promise that we would be able to ferret out or even try to ferret out every piece of duplication at that low level, I think it would require me to have a bureaucracy that would be so long that neither you nor I would like it. I think you have to count on having a quality faculty to avoid that aspect of the problem. I think it is unlikely that any good research man is going to permit himself to repeat a piece of work that was done sometime ago, and that is why I think the emphasis has to be on quality. I think what we want to do is be sure that two agencies are not plowing over the same ground on a very large scale, unknown to us and unknown to themselves and unknown to you.

There may be areas where we will encourage duplication. I think I have said that before to the Congress. I don't think that research on all parallel or duplicate roads is bad. And I think we should sometimes encourage people to work on the same problem. And we find that good research workers will rarely follow the same direction. People don't like to copy, and they don't like to start with a method somebody else has used.

I do think we have to place a responsibility on the agencies that are sponsoring the research to also be concerned about both the quality and the duplication problem.

And then at our level we have to try to coordinate and avoid gross duplication without design, and try to avoid an even more important thing; that is, missing important aspects of the problem.

For example, in this field today, because we haven't quite decided whether it is water research, atmospheric sciences, or oceanographic, a very important part of the hydrological cycle, which is the interaction of the oceans and the atmosphere, is not being studied by anyone, and an omission of this sort—

Senator ALLOTT. You say it is not being studied?

Dr. WIESNER. Not in detail. There are efforts going on. But I think that the looks we have had at this problem have led us to believe that here is a part of the research cycle that needs a great deal of additional potential and coordination, not only among people worrying about hydrology, but here we need cooperation between the people interested in oceanography and the atmospheric sciences. They do talk to each other, but I think that is a part where the Federal Government ought to see that the things we are paying for in these various fields are really complementary rather than completely isolated.

Senator ALLOTT. I thought some of the research projects of the National Science Foundation now are pretty well into that field.

On page 8 of your statement, at the bottom of the page, you say:

However, I would like to emphasize that in carrying out the provisions of this act with respect to support of universitywide water resources research centers, the Department of the Interior should, in effect, serve as an executive agent furthering the interests of all of the agencies in their common objective to strengthen the water resources research capabilities of the Nation.

The chairman of this committee went into some detail yesterday about this same question. And the difficulty he posed is with other departments. I don't suppose you mean here that the Department of the Interior should go into this; do you?

Dr. WIESNER. No. What I do mean is that the Department of the Interior, in dealing with academic institutions, should take into account the interests and the problems of other departments. For example, if a department, another agency of the Government, already has a well-established, well-running, competent water resource activity going on, I hope that nothing would be done under the institutional form we are setting up here which would cause the Department of the Interior to go in and compete for manpower or compete for resources.

So I do think we should have a continuing evaluation by the inter-agency coordinating committee of the creation of these new centers, and there should be general agreement that they are desirable.

And I would think also, in going into special areas and deciding on the kind of research that is going to be done, it would be well if the emphasis took into account the problems of these other agencies. And in some agencies the problems may relate more to water for agriculture, and others, such as in the East, where we have an abundance of water, to pollution problems. And then the centers ought to take into account the problems of health.

On the other hand, I don't think we should preclude cooperative activities between the various departments of the Government to the extent that they want to pool their resources and deal through a single agency. We know in the Department of Defense on many basic research activities this has worked very well. The three services have offered to pool their research in the university and managed to provide a much better facility than when they were competing for manpower. But I think something has to be said in many instances for coordination.

Senator ALLOTT. I would like to ask one further question. How do you feel about the portion of the bill on page 10, the bottom of page 10, which waives the provisions of section 3684 of the revised statute.

Dr. WIESNER. I have not formed any judgment, sir, I have not examined that problem.

Senator ALLOTT. Thank you very much.

Dr. WIESNER. I did not intend to imply that I was opposed to this provision of the bill.

Senator ALLOTT. I took it that you didn't have any opinion at the present time.

Dr. WIESNER. Yes, that is what I was saying.

Senator ALLOTT. Thank you.

Senator Moss (presiding). Thank you, Dr. Wiesner.

I think you should know that when this hearing commenced yesterday Chairman Anderson was very laudatory of the report you and your task force made on this subject. We considered it a great contribution, and we are using it very extensively here in this hearing. And so we are happy to have you here in person to testify today.

Your testimony has suggested some very good objectives and guides for the administration of the program proposed in the bill.

There may be some other questions.

Senator Metcalf.

Senator METCALF. No questions.

Senator Moss. Senator Nelson.

Senator NELSON. No questions.

Senator Moss. Senator Jordan.

Senator JORDAN. Doctor, I think we have to agree that wherever people are we have a water problem, the use of water throughout the world has been before us since the time that civilization began. And I suspect that research in the use of water has been going on since research began.

I wonder—of course, I realize that there is no end to the amount of studies that can be directed toward a subject of such universal interest. But is there any part of this we ever get behind us? We seem to go deeper and deeper, and spread our research efforts, with more agencies doing it, and more people engaged in it, and I wonder if we can ever say that we have put any of it behind us and draw from

the pages of history or from the experimentation and research even of foreign nations and foreign people?

Dr. WIESNER. Do you want me to talk about research in general or research in the water field?

Senator JORDAN. In the water field.

Dr. WIESNER. The answer is probably the same.

Well, first of all, the need. Except for certain areas of our country where there has always been a serious water problem, and where water management has been a way of life, our country has not had any serious water problems. We now have areas of the country, of course, where the problem is growing. And therefore the problem is becoming one to which we are being forced to pay more and more attention.

But there are other things about our society which are also making this necessary. Only one of the problems of water research is the question of how to assure adequate supplies of water. This is certainly a very important—to some people the most important—problem.

But there are problems of how we deal with pollution, and how we can control quality so as to preserve wildlife, fish, and game. We have problems in the field of agriculture where the problem of use of water can greatly improve our agricultural activity. And I think all of these are problems which are growing in extent.

Also I would say the following thing is true, that working in this field in the past, a large part of the research—you call it research, but it has not been research, it has been engineering, and it has been directed toward a fundamental understanding of the problem. And as we come to the point where some of the problems are more critical, and we come to the point where scientific understanding of many basic phenomena of nature is better than it was, we are in a position to apply our general basic scientific knowledge to understand problems of the water field that we couldn't understand before.

We are in a better position to understand the fundamental properties of water, which surprisingly enough, are very poorly understood. It is one of the commonest substances we have, but we know very little about it.

We know very little about the chemistry of water purification. We have invented by trial and error the processes. But when we become concerned about the economics of water purification, for example, then it is very important that we understand better than we do at the moment the fundamental properties of water processes. And the research that we have begun is in that field.

I mentioned earlier the interaction, called the interface between the ocean and the atmosphere. We have very little knowledge about the phenomena that go on. This is not important today, and probably will not be important in 5 or 10 years from now. But we are concerned with a period 20, 30, 50, or 100 years from now when our water requirements will be greater. And one of the things that we at least want to think about the possibility of is rather large scale weather modification. And here an understanding of the phenomenon is important.

It is also important in the prediction field. I think we all feel that there would be a great economic advantage in being able to improve our predictions.

So the building up of fundamental information in this field, a field which is an outstanding one—as I said earlier, we are spending \$10 billion in the water field, the field expenditures in the basic field are under \$100 billion a year, so it is very small——

Senator JORDAN. Here is my point, if I may interrupt. I believe in research, and I believe it is very necessary to carry out research. But what I would like to see sometime is an application of the things we learn in research toward the cleaning up of some of these streams that are polluted all over the country. Where do we get an application of the result we achieve in research toward accomplishing some of our objectives?

Dr. WIESNER. I am sure that if we set out to do it we can find a great many examples of research done in the past where it has not been applied. But the country is going to make the decision to carry the burdens and the cost and the inconvenience of clearing out pollution, which is not so much a fundamental problem of understanding as it is a problem of economics and law. I think there are many places where we know what to do, but research doesn't always make it cheaper to do something, or at least make it so cheaper that we are going to do it. It may make it easier or less expensive. But I think the pollution problem is a separate problem in research activities. I think that continued research and development is going to make it easier. But I don't believe that anyone who sponsors or advocates that we spend money on research will claim that it is going to eliminate pollution problems without major efforts.

Senator Moss. Senator McGovern.

Senator MCGOVERN. I just have one question.

You made reference to the rather acute shortage of trained people who are capable of carrying on research of this kind. Is it true that there is a potential pool of research talent that could be activated by legislation of this kind?

Dr. WIESNER. The studies which we have done on scientific and technical manpower in the last year have indicated to us that there is a very substantial body of young men and women coming out of the high schools—some of them go to college and some do not—who have the innate ability and competence to do research in any scientific field, including this one.

So that we were rather pleased to see—as we began our investigation we were concerned about whether or not technical manpower problems which we foresee for the next decade were fundamental in the sense that we were running out of young people to train and educate, and we couldn't believe that there is really a shortage of youngsters. And we believe that as our society's character continues to change so that we want fewer and fewer unskilled people, therefore freeing more and more people to do intellectual work, it is not only desirable but important to put them to work in these areas if we want to keep our society advancing and growing in the way that it is now growing.

Senator Moss. Senator Nelson.

Senator NELSON. Just briefly, you referred to \$10 billion a year being spent on water resources and development. What does that figure come from and what does that mean?

Dr. WIESNER. That word "development" there is probably misleading. This is in developing the facilities for supplying water, the water mains, the dams, the reservoirs, and distribution systems.

Senator NELSON. It does refer to that. Does it also apply to flood control projects, the acquisition of flood lands, everything affecting land?

Dr. WIESNER. Land acquisition is not included. I am not certain, but I think that this survey included in this all of the expenditures that are made for the improvement of our ability to manage water, flood control, navigational control.

Senator NELSON. It includes water plants for cities?

Dr. WIESNER. Yes. It is a very large sum of money.

Senator MOSS. Thank you very much, Mr. Wiesner. We certainly appreciate your testimony today, and the very fine report that has been prepared and made available to the committee.

Our next witness is Mr. Irving Fox, vice president of Resources of the Future.

We are happy to have you, Mr. Fox.

You may proceed.

STATEMENT OF IRVING K. FOX, VICE PRESIDENT, RESOURCES FOR THE FUTURE

Mr. Fox. I appreciate the invitation of the committee to appear today and offer my reactions and comments on S. 2, the water resources research bill. The interest of the committee in water resources research is particularly gratifying. There is a need for more knowledge relating to the use of water resources and I believe that the right type of research will yield large returns.

Senator ALLOTT. Mr. Fox, before you start your statement, will you tell me what Resources for the Future is.

Mr. Fox. I will be glad to. Resources for the Future is a research and education organization. It was established about 1952 by the Ford Foundation. All of the funds that support the work of Resources for the Future have been provided by the Ford Foundation. We have a staff of about 20-odd professional people who are engaged in studies in the field of natural resources generally, and we also provide grants to universities and colleges for studies in the field of natural resources, and some educational work. Our funds amount to about a million dollars a year, and roughly half of our research work is handled through grants to universities and colleges. Our work has been concentrated in what you might call the social sciences, economics, political science, law, and so on.

Senator ALLOTT. Where are your offices?

Mr. Fox. Our offices are here in Washington, in the same building as the Brookings Institute on Massachusetts Avenue.

Senator ALLOTT. Thank you.

Senator MOSS. Thank you very much, Mr. Fox. You may proceed.

Mr. Fox. At the outset I should emphasize that Resources for the Future as an organization does not take a position on legislation or public policy issues. Therefore, the views expressed are my own.

In my comments I propose to discuss what appear to me to be the basic features of S. 2 and then examine some of the major problems of administering a Federal program of the type visualized by the proposed bill. Inasmuch as the committee has excellent advice on the drafting of legislation, I do not propose to comment on the details of the proposal.

First, I will comment on the basic features of S. 2.

The general objective of the proposed legislation is to advance knowledge about the development and use of water resources at a more rapid rate so that in the years ahead the Nation will realize increasing benefits from these resources. This objective is to be achieved by engaging universities and other institutions in a larger and more effective role in water resources research. By providing support for centers at numerous locations, a wide geographic distribution of the research effort will take place. Furthermore, research bearing on all aspects of water development and use is encouraged instead of being directed to a specialized problem area which has often been the practice in the past.

I believe that the objective and basic features of the legislation are sound. It seems clear that a more rapid rate of scientific advance and institutional improvement will be needed to provide the benefits from water that a larger population will want and a more prosperous economy will require. In these circumstances, there is no question about the desirability of an expanded and more intensive research effort.

I will next comment on colleges and universities in water resources research.

Many universities and colleges already have underway substantial research programs relating to water. Some of these activities are being supported with Federal funds. S. 2 would enlarge the number of educational institutions engaged in research and permit an expansion of the work already underway.

There are, I believe, several reasons why it is desirable for universities and colleges to have more substantial programs of water resources research and for there to be a wide geographic distribution of the research effort.

First, when a substantial advance in a field of knowledge is wanted there is merit in having a number of quite independent institutions engaged in the effort, rather than intensifying and expanding the work of a few existing organizations. Within a single organization patterns of thought tend to harden. There occurs, I suppose, a measure of inbreeding of ideas and a narrowing of focus. When other institutions become involved, a more fertile environment is established which stimulates innovation and creativity. There becomes in effect a competition among ideas.

Second, a program of the type proposed in the bill will contribute to the strengthening of educational institutions. One of the most serious and important problems the Nation faces is that of equipping its universities to do the educational task which lies ahead. I recognize that S. 2 is not concerned directly with education. Also, I feel that the task of training people to do a more effective job of planning, developing, and operating water resources programs and engaging in research should be viewed as a separate problem and objective. Nevertheless, a research effort is the cornerstone of an effective educational program, particularly at the graduate level.

Third, my experience suggests that there are underutilized, competent research personnel, particularly at the smaller universities and colleges, whose talents could be applied effectively to water resources research. There is a tendency for funds from the Federal Government and foundations to go to the larger and better known universities.

Research personnel at the less well-known schools, in some fields in particular, even when fully competent, have difficulty in securing support.

In this connection the agricultural colleges merit special comment. In view of the tremendous advances that have been made in agricultural productivity, I believe that there are substantial numbers of research people at many of these institutions whose talents might well be diverted for short or long periods to water problems. The proposed legislation offers an opportunity to help diversify the programs of these institutions in accord with the needs of our highly urbanized and industrialized society.

Fourth, it is evident that research conducted at universities and colleges frequently offers a measure of freedom that is difficult to attain in Government agencies. This is particularly true of research in the social sciences or where a study has important policy implications. I am convinced that if some of the more complex economic and institutional issues relating to water use are to be attacked effectively, the work must be undertaken outside of the Government where research workers can be insulated from the influence of special interests, including a commitment—perhaps subconscious—to current Federal programs.

In citing these reasons for more effective participation by educational institutions in water resources research, I am not losing sight of the need for strengthening the programs of research actually conducted by Federal personnel. The so-called in-house research of the Federal agencies should not be neglected because it is, as I will explain more fully later, an essential corollary of a more effective program at educational institutions.

I would like to make a comment about the wide geographic distribution of the research effort.

The intention of establishing research centers at possibly as many as 51 locations does pose some difficult problems which I will comment on later. However, the needs of modern society, with a rapidly growing and large population, demand many centers of highly competent educational and research effort, not merely a few centers of excellence. In addition, the physical, social, and economic aspects of water supply and use vary a great deal by regions of the country. As in agriculture, research must be directed specifically to solving the problems of these separate regions. This can be done best by research institutions located within the regions which are sensitive to the problems of the areas in which they are located and which are available to serve the people and the enterprises of these areas.

I should like to comment on a broad program bearing on all aspects of water development and use.

There has been a tendency for Federal research programs to be narrowly focused. Operating agencies, such as the Corps of Engineers and the Bureau of Reclamation, have quite appropriately emphasized research bearing directly upon their individual operating responsibilities. The assignment of specific tasks to individual agencies has also fostered compartmentalization of research responsibilities. No organization of the Federal Government has had either the authority or the responsibility to look across the entire field of water resources and consider all kinds of research possibilities. This situation would be changed by S. 2, because the proposed Bureau would

be authorized to grant funds for a wide range of water resources research activities.

I am particularly pleased that the proposed legislation appears to offer the opportunity for more support for what I will call institutional and social science research. Here I refer to studies in the field of economics, public administration, political science and the law. Except for studies conducted by private institutions and some universities, this type of research has tended to be neglected as related to water resources. It is abundantly clear that because of limitations in our institutional arrangements—law, governmental organization, intergovernmental relations and the like—we are not deriving the benefits from our water resources that it should be possible to secure with existing levels of scientific and technological know-how. Recently this situation has been impressed upon us by practices followed in the Ruhr region of Germany for managing the water supplies of this highly industrialized area.

Last spring we sent a member of our staff, Dr. Allen Kneese, to the Ruhr to study water resources practices in that region. The report he brought back illuminates rather dramatically the point I have just made. This region has a population of approximately 8 million people crowded into an area about half the size of the Potomac River Basin. About 40 percent of the industrial capacity of West Germany is located in the region. Between 75 and 90 percent of total West German production of coal, coke, iron, and steel takes place there. The cities and industries of the area depend almost entirely upon the ground water and the surface flows of the relatively small streams of the area, although during extreme drought there has been resort to the use of the waters of the Rhine. The water supply on which the region depends is somewhat less than half of the supply available in the Potomac River Basin. It is, I believe, of the utmost significance that because of the unique arrangements that have evolved there, this large concentration of population and industry is capable of maintaining a high standard of living and economic productivity at relatively low cost for water and waste treatment, while maintaining the Ruhr River itself sufficiently clean to permit safe and pleasant recreational use. The Germans are not using a superior technology or a superior knowledge of hydrology. They have developed in this particular instance superior institutional arrangements for using the scientific know-how which is common to both countries.

Social science research is, of course, my special interest. I am convinced that the promise it holds is great and to neglect these studies could mean that the gains we make through our advanced understanding of physical and biological phenomena may be lost through our inability to utilize this knowledge effectively. It is for this reason that I am particularly pleased that the bill recognizes the need for support of work in the social sciences and law.

Now, I would like to comment briefly on three problems of administration.

The points that I have made so far clearly indicate that I am favorably disposed to the objective of S. 2 and the broad features of the approach contemplated to achieve that objective. To be realistic, one must recognize that a program of this nature poses some difficult administrative problems. Three of these are of major importance and I would like to comment on them briefly. They are:

First. The enlistment and development of sufficient competent personnel to conduct the research envisaged in the legislation;

Second. The retention on a continuing basis of the kind of staff required to administer a program of this nature most effectively; and

Third. The maintenance of an effective and dynamic program over time.

I want to comment on the first of these at the outset here.

Although I believe there are individuals capable of conducting research at many locations who are not being fully utilized, and that other people can be developed to undertake research of this nature within a few years, it is important to recognize that it will take time to get a program of this nature in full gear. In the interim it may be difficult to avoid considerable competition among institutions for the services of the relatively few more experienced and better known people. Such a result could be undesirable in terms of the objective of the proposed legislation.

I am glad to see that the legislation gives the administrator of the program discretion to determine when one of the proposed research centers is competent to begin work. Congress and the executive branch should expect the administrator to be tough-minded on this question because the best interests of the Nation, as well as the best interests of the universities, will not be served through the establishment of second-rate programs. This problem can be met in part by encouraging a degree of specialization at particular universities during the early stages of the program, based upon the special competence of the people a particular university now has. Following this approach, one university might specialize in ground water hydrology. Another might be able to initiate its program largely in the field of water law. A third might be concerned primarily with water quality technology, and others with engineering aspects of design. As time goes on it should be possible for schools with specialized programs to broaden them into other areas. We should not lose sight of the fact that in the long pull some of the largest payoff in water resources research will come through interdisciplinary—that is, different economics, engineering, law, all of these being combined in a total program of study—research programs.

In spite of efforts such as the foregoing, it would be provident to make haste slowly. I doubt that anyone can estimate accurately how long it will take to get competently manned centers functioning at all locations contemplated. We should be prepared to accept the possibility that it may take a number of years. Thus I feel that we should encourage a fairly gradual buildup of the program under both titles and insist, as the program progresses, that all recipients of funds be fully qualified to undertake the research contemplated.

Now, I would like to comment on the problem of administering the grant program.

The proposed Bureau has two heavy responsibilities. One of these is to determine whether the prospective new centers are capable of undertaking quality research, and the other is the task of awarding grants and contracts for research. The overriding objective is to develop and conduct a research program that promises the largest practicable payoff with available funds and manpower. Some may feel that it is not difficult to grant money, or that it may be assumed that at the salary levels contemplated for the top staff of the new

Bureau it will be easy to employ personnel capable of doing the job effectively. Or, alternatively, that the major burden can be shifted to special committees of outstanding individuals who will be convened temporarily to assist with the more difficult decisions. I believe that the task is more formidable than the foregoing views suggest.

Based upon my experience at Resources for the Future, I am convinced that it is extremely difficult to develop and operate a research fund-granting institution which functions with vigor, imagination, and creativity unless that institution is also engaged in substantive research in similar or related fields. To make the kind of decisions that need to be made requires people with research experience and competence and outstanding intellectual caliber. Such people are seldom attracted for long periods by either high salaries or the prestige of a position. They are attracted by an opportunity to devote at least a portion of their time to research.

Although consultants employed for short periods can help meet this problem, they do not promise an entirely satisfactory solution. There must be a highly competent permanent group in charge which can provide the imaginative leadership a program of this type requires; a group that merits the respect of research personnel at the Nation's universities. Furthermore, temporary consultants or advisory councils cannot have nor feel the sense of responsibility that a person does who must be accountable for the results over a period of time.

What we want is a scientifically oriented institution, that will attract and command harmonious working relationships with universities and colleges throughout the country. To achieve the respect of university research personnel, the Bureau must have on its staff individuals with good judgment in the research field and these people invariably are individuals who insist upon being engaged in research themselves. In other words, I feel that if we are to realize the full benefit of the opportunity afforded by the program envisaged in S. 2, the organization which administers the program should have substantive research responsibilities as well as fund-granting responsibilities.

I can well appreciate from my own experience in government that practical considerations may preclude such an arrangement at the present time. It may not be possible nor expedient now to resolve the question of how an intramural research program such as I have suggested would relate to the research activities of existing agencies. Possibly at the outset a group of able, dedicated research people can be recruited to administer the program envisaged in S. 2.

However, I doubt that such people will find a continuing incentive to stay with the program unless there is an intramural research effort. Accordingly, I feel that the Congress and the executive branch should be mindful of the need—if not now, within a few years—of combining the fund-granting program set forth in S. 2 with a Federal intramural research effort.

If this matter were seriously considered, I can appreciate that the Congress would be reluctant to assign an intramural research program to still another Federal agency when so many agencies are already engaged in some aspect of water resources research. Any effort to combine a program of the nature outlined in S. 2 with existing research programs poses difficult problems. In particular, agencies

with developmental and operating programs, such as the Corps of Engineers and the Bureau of Reclamation, may not be well suited to conducting a program of this kind, while at the same time they should engage in research to improve their own operations. On the other hand, the S. 2 grant program might appropriately be combined with existing programs of agencies that do not have strong developmental or operating responsibilities. Examples are the Geological Survey and the Public Health Service. Here the alternatives might be, and I will mention three possibilities: First, to assign the S. 2 program to one of these agencies; second, to consolidate two or more of these agencies and the S. 2 program within one of the existing agencies; or third, to consolidate two or more of these agencies and the S. 2 program in an entirely new bureau.

A move in this direction would not only strengthen the program contemplated in S. 2, but it could have a salutary influence on the total Federal water resources research effort. Many Federal agencies are and should continue to be engaged in various aspects of this research. Contrary to an often expressed view, the task of coordination—in the sense of avoiding duplication of activities and exchanging information—is not serious. What is serious is that no one has the responsibility for examining the full range of research possibilities in light of what research is under way and in view of the significance of existing or emerging water problems and then applying Federal funds to encourage research where the payoff promises to be greatest. An agency that has research responsibilities including both an intramural and a grant program, and which does not have operating and developmental responsibilities, could perform this function. Furthermore, this could be done without infringing upon the freedom of inquiry of research personnel or interfering with the authority of other Federal agencies to conduct research essential to the improved performance of their assigned operating and developmental responsibilities.

As a final point, I would like to comment on the maintenance of a vigorous and effective program over time. I think it is difficult for anyone to foresee all of the problems and all of the consequences of a new program of the type proposed. Accordingly, we should be prepared to make adjustments in the program after we have had some experience with it.

With this in mind, the committee might wish to consider writing into the bill arrangements for a periodic, independent appraisal of the program. The people whose activities are evaluated feel apprehensive about having such assessments made. But I am convinced that they are salutary.

One possibility for handling a periodic evaluation of this kind would be to assign responsibility to the Comptroller General. He could be authorized within, say a 5-year period and each 5 years thereafter to convene a panel of recognized experts in the field of water resources research who would make a careful review and assessment of the program, probably over a period of several months, and submit a report on their evaluation of the accomplishments of the program and their suggestions as to how it might be improved. When these reports are received by the Congress, consideration could be given to amending the legislation on which the original program was

based. If the adjustments could be made through executive action without new legislation, such possibilities could be considered by the President and the department head responsible for the program.

Mr. Chairman, I hope that the foregoing observations and suggestions will be of value to the committee.

Senator Moss. They are indeed very helpful. This is a thoughtful presentation that you have made. And we appreciate your coming here to give us your suggestions today.

This is a somewhat new area, and reaching out and trying to have so many areas of research going, and one of the problems that we worry about is this diffusion of effort over a large area. And you pointed to some of the trials that may be encountered in doing this. We are very happy to have you here today.

There may be some questions.

Senator Allott, do you have some questions.

Senator ALLOTT. No; I do not.

I would like to say, though, Dr. Fox, I appreciate your paper. I think you have made a very conscientious and sincere effort to be constructive and helpful, which I can't say is true of all of our witnesses.

You have raised in the case of the Bureau situation one question which we perhaps ought to recognize. We have available, not only in this country but almost throughout the world, a great amount of knowledge which will enable us to cure some of our ills if we would only utilize it. It isn't always the necessity for new knowledge so much as it is the intelligent application of the knowledge we have. It is a sad commentary, perhaps, that people get enthused with painted pictures, but are satisfied to live in a community where a cesspool runs down the middle of it that can hardly be tolerated.

But I do appreciate your comments.

Senator Moss. Thank you.

Senator Burdick, do you have any comment? I know you just came in.

Senator BURDICK. No questions.

Senator Moss. Senator Metcalf?

Senator METCALF. No questions.

Senator Moss. Senator Nelson, do you have any questions or comments?

Senator NELSON. Yes.

I have been concerned about an aspect of the bill which gives the Secretary of the Interior \$10 million a year for—ultimately \$10 million, I guess—for allocation to research projects, and specifically on the very point you were making. What proposals are there in the bill for an evaluation of the nature and seriousness of the problems and lining them up in some order of priority so that the Secretary will be allocating research funds out of this \$10 million to the most serious problems first?

Mr. Fox. Well, I would assume—as I interpret the legislation, the Secretary has authority to establish some priorities and determine which should come first. This means, I assume, that he will seek to assemble, if the bill is enacted, a staff of people who are competent to do this. I assume the staff is provided by the bill. I assume further that he will also assemble consultants to advise him on this matter,

advisory groups, and so on. And out of this I would anticipate that he would have authority to establish criteria for considering projects, areas of emphasis, and the kind of problems, you might say, that deserve first priority.

Senator NELSON. There is nothing that you can see, is there, in the bill that requires that to be done? In other words, I take it from reading the bill that if various universities around the country submitted proposals—which may all be fine—that took up the \$10 million, that without any policies at the Interior level, you might grant the \$10 million here and proceed with various research projects with no direction to it at all?

Mr. Fox. My impression is that the authority is permissive. It seems to me that it would be the logical thing to do. I do not believe that it is directed or required—it would be difficult to see a responsible administrator going about it in any other way.

Senator NELSON. I take it it is permissive because there isn't anything in the proposal as I can see—

Mr. Fox. You mean as to criteria?

Senator NELSON. As to establishing priorities by any criterion at all.

Mr. Fox. I hesitate to trust my memory, but as I remember it, there is authority for him to do it; but he is not directed to do it.

Senator NELSON. What I am getting at, how do you do that?

Mr. Fox. How do you do it? Well, you are relying, of course, in large part on your judgment of people, an assessment of what are the most serious problems on the one hand, the ones that you might say are plaguing it the most. And we have a fairly good basis, I believe, with the knowledge that may be assembled in recent years, of what our more serious difficulties are.

And second, there is the question as to the scientist's judgment as to what the promise is as to research in particular areas. And I assume that out of this one could develop a set of criteria, or if not one, a group assembled for this purpose.

Senator NELSON. Let me put the question another way. If the bill does not specifically propose that this shall be done, and some method for it, isn't there a distinct possibility that the research and the allocation of that \$10 million would be willy-nilly to applications that come from universities around the country?

Mr. Fox. Well, it is hard for me to judge on this question, sir. I would assume that the type of people that the Secretary would want to recruit for this job would be very much interested and want to do this sort of thing. I suppose there is always the chance that there would be considerable pressure to get moving to use the money that is available, and not be too much concerned about criteria and being tough minded about what these elements are. These are pressures that I think any research group has to contend with. And conceivably some change in language might make it easier for an administrator to withstand this kind of thing.

Senator MOSS. Senator McGovern.

Senator MCGOVERN. No questions.

Senator MOSS. Thank you very much, Mr. Fox. We certainly do appreciate your testimony today.

Our next witness is Dr. Arthur Maass, professor of government and chairman of the faculty committee of the Harvard water program.

Dr. Maass is a very distinguished authority on water resources. He served in the field of the Hoover Commission about a decade ago. And he is the leading author of a book on the design of water resources systems, a copy of which I have here which was brought over from the Library.

We appreciate your coming down here today to share with us your comments on the pending legislation, Dr. Maass.

**STATEMENT OF ARTHUR A. MAASS, PROFESSOR OF GOVERNMENT,
AND CHAIRMAN, FACULTY COMMITTEE, HARVARD WATER
PROGRAM**

Dr. MAASS. Thank you very much.

Title I of this bill promotes continuing research on water resources in the land-grant colleges. This in my view is an admirable objective for the very same reason that Senator Anderson gives in his statement introducing the bill which appears in the Congressional Record for the 14th of January, namely, the success of this particular pattern of research in the field of agriculture, the need for water resources experts who can be trained in association with widely dispersed research programs in the land-grant colleges; geographical variations in water problems, and the desirability of strengthening State and local agencies concerned with water development by having research facilities available to them for advice and assistance.

I should add to these that the proposal to match the research capacities and research facilities of the land-grant colleges and their associated experiment stations with the research needs in water resources is most fortuitous. As the importance of agriculture declines relatively in our economy, exciting research opportunities become fewer in agriculture in relation to those in other fields. Thus, unless the prospectives of the agriculture at institutions broaden to comprehend new challenges, it is unlikely that they will be able to retain their traditional high standards, and many of the young who have previously been attracted by these institutions will gravitate to other work.

To a certain extent a desirable broadening of prospectives is occurring now in the agricultural research institutions. Witness their growing interest in recreation, in rural redevelopment, in foreign agriculture. At the same time, research in water resources involving complex technological, economic, and governmental factors in the development and use of water for industrial and domestic and recreational and other uses in addition to agriculture should provide a significant stimulus, a new and important challenge for many groups of professionals interested broadly in national resources, and in public investments.

In short, title I of the Anderson bill would affect a happy marriage between institutions in search for research opportunities and research needs in search for institutions to support.

Title II, providing for research in centers of excellence other than the land-grant college, is a desirable and necessary complement to title I. Our experience since 1955 in the Harvard water program confirms, I believe, the several bases on which, according to Senator Anderson's remarks in the Record, justification for this title rests.

Most important, we have found that with an interesting and carefully formulated research objective, we have been able to attract and retain the attention of leading professors in several fields who without the stimulation of the Harvard water program would have done their research on other subjects.

I should point out that if this result is to be achieved, it is essential that funds be assured over the full period needed to carry out the research.

For the land-grant colleges this is provided in a sense by the annual grants of title I of the bill. For the private centers of excellence it will be necessary to authorize no year appropriations as is now customary in space, defense, atomic energy, and other fields of research supported by the Government, and to make use of such authority in budgets and appropriations.

If I understand section 304 of the bill correctly, and I may not, it authorizes advances out of appropriations. If I am wrong, however, the bill in my view should be amended to accomplish this purpose and in any case, I think the need for such funding should be entered in the record of your hearings today.

Finally, the water resources research bill does not and cannot attempt to rationalize the organizational structure of government agencies concerned with water resources development. Your committees and others in the Congress, the executive agencies, and all of us interested in water resources must be especially careful, it seems to me, not to encumber this limited-purpose bill with a responsibility for which it is not the proper vehicle. Equally we should not delay enactment of the bill until the organizational problem is solved, if it ever will be solved. The date for this none of us can foresee and we should get on now, it seems to me, with needed water resources research.

Senator Moss, that is the conclusion of any formal statement I have. I will be glad to answer any questions.

Senator Moss. Thank you very much, Mr. Maass. We know of the very excellent program that you have been carrying on with the Harvard water program. Therefore, we are most happy to have your comments on this legislation being considered by the committee.

Do you have any fears about the rather wide diffusion of research effort that would be made, assuming that we have 40 or even 50 of the centers set up?

Mr. MAASS. I would answer that in this way, Senator, and the answer is somewhat similar to the answer that Dr. Weisner gave to a similar question. Certainly in fields where we are making great research progress, I think, the health field, for example, through the grants administered by the National Institutes of Health, and the various research programs of the defense and space agencies, they are not terribly self-conscious about the problems of duplicating research. It may be that if two or three groups of experts work on the same problem, they will have different approaches and come up with different answers and be able to evaluate each other's work. I think to a certain extent the same is true of the vast research program in the Department of Agriculture and I just have a feeling that because the problem of organization in water resources has been such a sensitive one over a number of years because of the agencies involved, we

tend to be too sensitive about the dangers of duplication of research in this field, and I am not terribly concerned about it.

Second, I would point out that in many of these problems, although the basic research may be similar for all problems, there are significant regional variations in the adaptation of the basic research to particular problems and using the land-grant colleges may be the very best way to achieve an adaptation of these technique to the problems in different areas.

Senator MOSS. Problems of each of the areas.

Mr. MAASS. Yes, sir.

Senator MOSS. Thank you very much. I appreciate that.

Do you have any questions, Senator Burdick?

Senator BURDICK. I wasn't here at the early part of the hearing and maybe this question was gone into. But could you describe the apparatus that exists formally throughout the country between the various land-grant colleges and universities for the exchange of findings of information?

Mr. MAASS. Well, I am sure there are several. I don't know that I can answer your question as well as Dr. Byerly could, for example, but there are several means.

One, the Department of Agriculture itself has a very fine bibliographic service including a monthly publication by the Library of the Department of Agriculture of all bulletins and research findings of the different stations and universities and private institutions, too. This is a source that I know I have consulted many times and I am sure everyone who works in this field does.

It certainly is one means.

Second, of course, the manner in which the publications of these research institutions are subsidized in a sense by the grants made to the agricultural colleges and research stations and by the franking privilege which they have for mailing, helps to insure that this information is interchanged.

And finally, of course, each or many of these projects involve research in particular fields. The professions have their journals on research and as a result that research which relates to one field will be reported in the journal or the abstract of that particular field.

So I think there is a fairly wide interchange of information among research people interested in the same field. Specifically I probably should mention finally that Resources for the Future—Mr. Irving Fox testified immediately preceding me—puts out, for example, a monthly little bulletin which in some ways summarizes important research going on in various institutions in different source fields.

Senator BURDICK. Thank you.

Senator MOSS. Senator Metcalf?

Senator METCALF. Nothing.

Senator MOSS. Senator McGovern?

Senator MCGOVERN. Nothing.

Senator MOSS. Thank you very much, Dr. Maass. We do appreciate your appearance and testimony.

Senator MOSS. Dr. Omer Kelley, of the Stanford Research Institute, will be our next witness. We are pleased to have you with us, Dr. Kelley. You may proceed.

**STATEMENT OF OMER J. KELLEY, MANAGER, AGRICULTURAL
RESEARCH CENTER, STANFORD RESEARCH INSTITUTE**

Mr. KELLEY. Thank you, Senator. It is a pleasure for me to be here today.

I might give you just a little background concerning myself and the Stanford Research Institute.

Senator Moss. We would appreciate it if you would do that, Dr. Kelley.

Mr. KELLEY. I am manager of the agriculture research center at the Stanford Research Institute in South Pasadena. The Stanford Research Institute is affiliated with Stanford University. It is a nonprofit, non-tax-supported, nonendowed research organization that does research for business and for Government.

We have around 2,200 people on the staff. Last year we did about \$34.5 million worth of research.

We have always been interested in water research and in resource research and I might quote from the institute's charter :

* * * to promote and foster the application of science in * * * the discovery and development of methods for the beneficial utilization of natural resources.

Previous to my affiliation with the Stanford Research Institute, I was with the U.S. Department of Agriculture for 19 years, during which time for the most part I was in charge of their soil and water research program in the 17 Western States. So having spent most of my life in water research in the western part of the country, I feel that I do have some knowledge of water problems as they exist in this part of the country.

Obviously the West is not alone with respect to water problems. The problems exist throughout the Nation and they are becoming more and more critical even in the more humid parts.

I don't feel there is any need for me to try to evaluate water problems in the country because they have been amply documented and your committee I think has been one of the foremost in calling these to the attention of the people and has done an excellent job on it.

Rather, I would like to talk a little bit about some of the opportunities in research. Being a research man myself, I naturally believe that any problem can be solved by research if enough effort is put to it. We have to recognize, of course, that one can over-research a problem. However, I don't think there is any imminent danger of this happening to the water problem.

To be sure, we have made progress on our water problems in the past and in relation to the amount of money that has been spent, I think we have made substantial progress. But in relation to the needs I think our progress has been slow.

The need for solving our problem seems to be increasing exponentially with time.

In many areas already the immediately available water supplies are completely allocated. In other areas the quality of the water has been reduced to the extent that it is questionable for human use and even for agricultural and industrial purposes.

While these situations are alarming, they need not be discouraging because science, too, has been progressing during this period of time.

Senate bill 2 would do much to add emphasis to the water research program. Your committee print of last September itemizes the various water problems and I believe that these are conclusive, and while there may be some research being done on most aspects. I feel that none of them are receiving the total amount of research they should and I am also sure there are some aspects that are not receiving any attention.

I would like just as an example to mention one area of water research, the water problem, where I think there is a tremendous opportunity. By this I don't want to imply that there aren't opportunities in all these areas. I believe there are. But I would like to mention one and this applies over most of the arid and semiarid parts of this country as well as the world.

If we take a look at the State of Arizona, for example, there are in excess of 80 million acre-feet of water that falls in that State every year. It is averaged out, of course. Some years will be higher and some years will be lower.

Now, if we make the most optimistic estimate that we can, there is less than 6 million acre-feet of this water that is beneficially used. In other words, it is used by beneficial crops or finds its way into streams or underground aquifers. So this, you see—a very small amount is used.

What happens to the rest of this? The rest is lost either by evaporation from the soil surface or by nonbeneficial plants and in the case of Arizona the bulk of it is lost by evaporation from the soil surface. Maybe we can't do much about that right now but certainly research can.

For instance, there is no question in my mind but that there are areas in the United States and also in the world where the land would be more valuable for the water you could get from it than for any other use, and it is conceivable that science could so treat these areas that you would get 100 percent runoff.

Now, you have problems. It is not too difficult right now with the knowledge we have to treat an area so that the water will all run off. But one does have other problems. You have problems of stabilizing the soil to prevent erosion. This is a serious problem, you have the problem to prevent weed growth if you do get some moisture there.

But I want to point this up. I think there are tremendous opportunities here and throughout this whole water field.

Now, solution to these problems isn't just going to happen. It is going to come about only by research and by the application of science and technology to the water problems.

I would like to comment on one other aspect of the bill. Having worked 19 years with the Federal Government in water research, I have some appreciation of the problems concerned with information on water research at the Federal level. As your committee found out when beginning studies were made on this, there was no single place, there had been no level where one could go and obtain an up-to-date statement of figures or information on all of the research activities of water in the Federal Government or the extent and amount of money and types of programs that were going on.

I think your bill, Senate bill 2, would do very much to alleviate this problem.

This is important not only to people like yourselves, your committee. It is also of equal importance to scientists throughout the country.

Now, in view of the testimony that has gone on earlier in relation to duplication and people being up-to-date on research, certainly data that is published is easy to stay up-to-date on and I think Dr. Maass and Dr. Weisner pointed this out amply, that top scientists do know what is going on pretty well from the standpoint of data that is about to be published and this sort of thing. But I think there are lots of investigations, in fact I know there are, in the Federal Government that go on that may never be published. They are done for a given agency or this or that, and it is this type of information that is a little bit difficult to get until it is published.

Eventually when it is published, it is not difficult.

I think this bill would be very helpful from this particular standpoint.

One other aspect I would like to comment on, and that is with respect to the finances. A modest amount of money is mentioned initially with respect to this bill. I don't think there is any question at all but that the human resources and the physical resources are now available to use immediately, efficiently and effectively the money that is available in the first years of this bill.

Now, by this I don't want to imply that we don't need more scientists. We do need more scientists and as time goes on we will probably need more facilities, but this bill tends to help to provide these things.

I might comment on one other aspect. In some ways I think we are very fortunate when we look at the water problem in that it is diverse. It involves the many disciplines of science as was mentioned here earlier. The socioeconomic, hydrologists, engineers, physicists, lawyers—it is a gamut of disciplines, so that this in itself makes it easy to get started on a program of magnitude that you are talking about.

I might divert here. I think this is all I care to say with respect to my text, but I might divert just to give you an example of one of the things I am talking about.

One problem we are working on now in the water field is being handled almost entirely by an organic chemist and one might say, well, what is an organic chemist doing in the water field? Well, an oil company came to us with the problem that they have in trying to get rid of water that is in their oil. They have an appreciable amount of water from a number of wells. These waters contain boron up to about 7 to 10 parts in a million and anything in excess of 2 parts to a million will kill most plants.

Where are they going to put the water? In the past they have been putting it into consumption and it was seeping into the underground supply and the State water board said they couldn't do this. They have got to get rid of this. How do you get the boron out of this?

The first thing is to develop a chelating material to tie the boron into the water so the plants can't get it. The plant would take up just as much boron as it would if the material wasn't in the water, but it doesn't break down and react. This gives the oil company a temporary lease on life here, but the problem still comes up, will this break down in soil? If it does, then maybe it is just as detrimental over time as if you don't have the chelating material in there.

Another chemist was sitting in on the discussion on this and he said there was no reason why you couldn't modify this chelating material so it would be insoluble in water and soluble in oil. So if this was mixed with the oil and water as it came out of the well, the boron would then go into the oil phase and not in the water.

I don't know if this will happen, but we are doing research on it by the organic chemist who one would think would never be working in the water problem.

The thing I am pointing out is that the water problem is of such diverse nature that any research will find some input into some phase of the water problem.

I thank you very much.

Senator Moss. Thank you very much, Dr. Kelley.

You did not fully read your text, so it will appear in full in the printed hearing record here as well as your comments which we appreciate very much.

Working as you do in the field of water research, we appreciate having your expert comment and are glad to note that you approve generally of the provisions of the bill and believe that it will be helpful in stimulating accelerated research in the water field whereas other witnesses have said, and I am sure you agree, although a lot of research is being done, we just don't seem to be holding our own.

We are falling behind because of the tremendous increase of demands on our water supply.

Do you have any questions, Senator Metcalf?

Senator METCALF. No questions.

Senator Moss. Thank you very much, sir.

(The full prepared text of Mr. Kelley follows:)

PREPARED STATEMENT OF OMER J. KELLEY, MANAGER, AGRICULTURAL RESEARCH CENTER, STANFORD RESEARCH INSTITUTE

I am Omer J. Kelley, manager of the agricultural research center of Stanford Research Institute, in South Pasadena, Calif. Stanford Research Institute, affiliated with Stanford University, is a nonendowed, nontax supported research organization which conducts research for businesses and the Government. We have a staff of slightly over 2,200 people and last year conducted some \$34.5 million of research. We have a wide variety of interests and are particularly concerned with our natural resources, of which water is a primary concern. To quote from the institute charter, " * * * to promote and foster the application of science in * * * the discovery and development of methods for the beneficial utilization of natural resources."

Previous to my association with Stanford Research Institute, I worked for 19 years with the U.S. Department of Agriculture during which time I was in charge of the soil and water research program for the 17 Western States. Having been born and reared in the Western part of the United States, and having worked most of my life in soil and water research in that area, I feel that I am well acquainted with many of the water problems of that part of the country.

Obviously, the West is not alone with respect to water problems today. Water problems exist throughout the United States. That these problems are of extreme importance and becoming more critical every day has been amply documented many times; your committee has been one of the foremost and most active groups in the United States to so recognize and document. I, therefore, feel that there is no need in attempting to list the many water problems to such a well-informed group as you. Rather, I should like to discuss the tremendous opportunities that exist for the solution of the water problems throughout this country, and some of the steps that need to be taken.

Being a research man, I naturally believe that all problems can be solved if enough time and effort (this means financial support) are devoted to proper research. Obviously, one can overresearch a problem, but there is certainly no

imminent danger of this happening to our water resource problems. To be sure, we have made progress in the past through research; in relation to the amount of money invested, this progress has been substantial. But in relation to the needs of the people and to opportunities that exist, the progress has been slow. The need for solution of many water problems seems to be increasing exponentially with time. In many areas today, all of the immediately available water supplies have already been allocated. In many cases the quality of the remaining water has become so poor that it has questionable use for human consumption and for agricultural and industrial purposes. While these situations are alarming they need not be discouraging because science has been progressing. The real need is to advance knowledge and to apply our newer sciences in the field of water resources.

Senate bill 2, which we are discussing here today, will do much to add needed emphasis to the water research program. The tremendous amount of background material compiled and made available in support of this bill outlines extensively and completely the opportunities for research accomplishment in relation to the water problem.

Your committee print published in September of last year itemized the various water problem areas. While I am sure these are inclusive and some research is being done on the various items listed, I am equally confident, and believe the committee will agree, that there is inadequate research on all the items listed. In many cases there are vitally important phases which as yet are not receiving research attention. While I do not want to go into each of the specific categories and discuss their research needs and potential, I would like to take just one item as an example and give some statements concerning potentials that exist through research.

In the State of Arizona, almost 82 million acre-feet of water fall every year on the average. By the most optimistic estimates it can be determined that not more than 5 or 6 million acre-feet of the water that falls in the State of Arizona is beneficially used or can be accounted for by streamflow and underground accretions. The remainder of this water is lost either through evaporation from the soil surface or through evapo-transportation from nonbeneficial crops. There is little doubt that, through proper research, a tremendous amount of this water and similar losses in other States can be salvaged. For instance, we know that there are ways of treating the soil to improve water run-off rates. Even with the present knowledge, costs for doing this are not particularly great. There are, of course, other problems associated with the reduction of the type of losses just referred to that would have to be solved. The main ones involve soil stabilization to prevent erosion, and the cost-benefit economics of individual situations.

There is little doubt in my mind that research could find better and more economical ways than are now known to save water that is presently being lost. I wanted to bring this particular problem into focus because I believe herein lies a tremendous source of potential fresh water which is now being lost not only in the State of Arizona but to all the Southwest and in many arid areas of the world. One does not have to do much calculating to determine that even in the 4- to 5-inch rainfall belt if one could save the water, say from two-thirds of the area and put it onto the one-third remaining, there would be sufficient water remaining for crop production, particularly of the dry-land type of crop. In higher rainfall belts there would even be water available for irrigated crop production.

Solutions to these problems and the many others listed by your committee are not just going to happen. Solution is going to come about only by research and through the applications of science and technology, requiring the many disciplines of science. To be sure, these solutions can be brought about only if sufficient research effort is put forth.

Having worked with the Federal Government for nearly 19 years, where a good share of activity was concerned with water research, I am aware of the problems of coordination of water research activities at the Federal level. As your committee found when you were preparing background information, there was not available at any one place within the Federal Government a single source which could supply the nature and extent of water resources research activities conducted by the Federal Government. To an outsider it seems incredible that such a situation could exist, but it does.

This bill would do much to correct this situation in that it would provide for one agency to accumulate and categorize Federal research activities in water

resources. It would do the same, if my information is correct, with respect to other research activities in water such as conducted by the States and other research organizations. There is a great need for this type of activity. It not only makes it possible for the scientists throughout the Nation to have a knowledge of what is going on, on an up-to-date basis, but it also makes it possible for a committee such as yours and other interested groups to have the same knowledge and to evaluate programs in light of the total research effort. I believe this will do much to make for a more complete attack on the various research problems. As indicated earlier, there are a number of problems which do not now receive attention and I am equally certain that there are a number of activities in which there is a duplication of effort. To me, the latter is less serious than the former. To categorize on a current basis all water research by the various research agencies will indeed be a great help.

The amount of money as suggested by this bill for the initial water research program is quite modest. I would like to dispel any fears that anyone might have that there is not now available an adequate amount of trained manpower to utilize this amount of money to a very good advantage. There are at the present time, in various States and private research institutions throughout these United States, tremendous amounts of the scientific resources. This is true not only with respect to the human resource but with respect to facilities, both of which are available to make good use of the amount of money that is mentioned in this bill.

To be sure, as progress is made, more facilities and new equipment will be needed to make maximum progress in water research. Likewise, additional trained men will be needed, and the bill provides for assisting along these lines. The point I am trying to make here is that the initial amount of money to be made available through this bill can be put to immediate, effective, and efficient use. I am confident that these programs of research can be undertaken in the immediate future without having to raid existing present Federal and State research teams.

In many ways we are fortunate with respect to water problems. They do not involve single disciplines, but a multitude of disciplines. For instance, most any problem one would think of with respect to water would involve a group of disciplines, such as physicists, chemists, mathematicians, geologists, engineers, agriculturalists, economists, sociologists, and so forth. When one thinks of solution to these problems, the input of scientific knowledge comes from a group of people. The carrying out of the actual research in many cases can be done by less well-trained people under the supervision and guidance of a few chief scientists. It is because of the nature of this research and the kind of studies laid out that the needed research can be done by scientists that are already available and facilities that already exist.

I should like to make one further comment which has to do with our present concept of water and water problems. The committee has considered the water problem from several aspects, such as use for recreation and human consumption, in addition to the agricultural, industrial, and sociological-economic aspects. Research must also include all of these aspects. Each phase must be included according to its importance. The program envisioned in Senate bill 2 is one that has long been needed and certainly is headed in the right direction insofar as helping the American people solve the problem of water resources.

Senator Moss. We have remaining four witnesses to be heard and—maybe we don't. There is one that is to be filed only, so perhaps we have time. I was beginning to worry about the clock.

Dr. Milton E. Muelder and Dr. L. L. Quill, of research development, Michigan State University, will be our next witnesses. We appreciate hearing from you gentlemen.

STATEMENT OF DR. MILTON E. MUELDER, INSTITUTES OF WATER RESEARCH DEVELOPMENT, MICHIGAN STATE UNIVERSITY, ACCOMPANIED BY DR. L. L. QUILL

Mr. MUELDER. Senator Moss, members of the committee, we appreciate very much the invitation to testify on Senate bill 2. President

Hannah is out of the country on an important mission, therefore is unable to respond affirmatively to the request that he appear. His views, however, in support of this bill as well as the previous bill that was introduced last year I think are well known and he has asked us to represent him. We are also coming in our own behalf in response to the invitation.

We endorse warmly the creation of water resource research centers at the land-grant institutions. As many have indicated and emphasized, interdisciplinary approaches which are so important for water research are well established at these universities. These institutions have extensive experience in how to relate effectively research, teaching, and extension. Indeed, the continuous exchange among land-grant institutions of knowledge, ideas, and research results on water resource problems will undoubtedly bring to this critical area the same successful endeavor which these institutions have brought and continue to bring to the question of food and agriculture. Experiences at Michigan State University are possible of duplication elsewhere.

Within its limited and restricted resources, the Michigan State University's Institute of Water Research, of which Dr. Quill here is the director, serves to coordinate and stimulate concern on this important national, natural resource among a wide spectrum of university disciplines.

The institute of water research is assisted by an all-university advisory committee whose members come from the respective disciplines having important water research interest. Limited funds, however, allow for only a small expression of the university's great potential in making substantial contribution to the water problem.

Research can be supplemented in an important way by teaching programs in a large number of disciplines. Career opportunities in water management for personnel having the benefits of discreet training and research experiences could be developed rapidly if adequate support were available. Water management cuts across a variety of fields and problems: engineering, agriculture, disposal of waste materials, the location and production of a water supply, recreation, water rights, to mention only a few. Courses at Michigan State University make a good beginning to provide excellent training in water problems: for example, hydraulics and fluid flow, the design of supply and sewage disposal systems, geophysics, structural geology and hydrology, water resource development and conservation, watershed management, public health sanitation, water and sewage and wildlife management, et cetera.

At many institutions such as at Michigan State University a large number of departments are engaged in water research. We noted at Michigan State University in a survey 2 years ago, that 73 projects related to water research were being pursued by 80 faculty and 21 departments. But a central office such as a water research institute is needed to coordinate these efforts, to relate them more effectively to the national water problems, to fill wide gaps in research efforts, to relate university efforts and interests to State, regional, and national requirements, and to assist in the establishment of appropriate training and extension programs.

The institute, however, can only operate to its maximum effectiveness with resources. Thus, at Michigan State University, the water research institute currently is able to support, out of very limited funds, only six research projects from the many submitted to it. This is an important start, but it is an extremely small step. These projects, incidentally, involve six different departments and three colleges. One of these projects has been integrated with a study requested by the U.S. Forest Service which is contributing funds on a matching basis.

Water problems are national, they are regional, they are State, and they are local in character. Land-grant institutions are long accustomed to working effectively and cooperatively in all four of these dimensions. They have a long history in relating university resources to the solution of complex problems involving many disciplines. We are sufficiently conversant in our interdisciplinary studies at Michigan State University to appreciate the proportions of the problem; we also appreciate the benefits which would accrue if we were able to properly mobilize the resources, scientific knowledge and skills of the entire university. Like other land-grant institutions we are dedicated not only to new knowledge in its own right, but also in behalf of society.

We reemphasize very strongly the deep concern of Michigan State University over the complex water problem faced by our Nation and believe that the general principles of the proposed bill are sound and workable.

This much for our statement, members of the committee. We will be very happy to respond to any specific questions which you would like to put to us.

Senator MOSS. Thank you, Dr. Muelder. We appreciate that very much and I was glad to note that early in your statement you emphasized the point that this effort would not only give us advance in the field of research but it is a good teaching device for preparing more technicians in the field.

I think we are limited somewhat by the number who are qualified now to do advanced research in many of these water disciplines. By this method we would have many more in a short period of time at our teaching institutions. I appreciate it. We appreciate your being here, Dr. Quill.

Did you wish to add any comment at this point?

Dr. QUILL. I think he covered it very well.

Senator MOSS. Thanks. Maybe Senator Metcalf has a question.

Senator METCALF. We appreciate your appearance.

Senator MOSS. Thank you so much. We do appreciate it.

Mrs. Haskell Rosenblum, the director of the League of Women Voters of the United States, is here and will testify. The League of Women Voters has taken such a great interest in the field of water resource development, has appeared before this committee and before other committees on which I serve whenever we are taking up the subject of water resources, and always has made a great contribution. I feel gratified that you are prepared to testify today on this bill that is before us.

Mrs. Rosenblum.

STATEMENT OF MRS. HASKELL ROSENBLUM, DIRECTOR, LEAGUE OF WOMEN VOTERS OF THE UNITED STATES

Mrs. ROSENBLUM. Thank you, Senator Moss.

As Senator Moss and Senator Burdick both will remember, members of the League of Women Voters appeared at 21 out of the 22 field hearings of the Senate Select Committee on Water Resources. Leagues watched for the committee report and took its recommendations seriously. It is with pleasure therefore that I now appear as their representative to speak in upport of legislation to further the Senate committee's recommendations for expanded research.

From study of their own river basins and regions, league members spoke to the committee about the unsolved water problems of their home areas. Different as were the water needs described from Idaho and Indiana, from South Carolina and South Dakota, there was one need that appeared again and again as leagues carried on their studies. There was one problem basic to the polluted Potomac, the flooding Mississippi, the water-short lower Colorado, the salmon-rich Columbia. A quote from the California league will illustrate:

Research is an integral part of intelligent planning. There is need for more funds for basic data, more continuity in research and coordination of the data collected. * * *

Every area had the problem of insufficient knowledge, every basin needed more information and better data. Leagues found that irrevocable decisions had to be made based at best on educated guesses. There were no answers to many of the questions league members asked. From our own experience we learned of the need for basic and applied research in the water field.

Efficient utilization and protection of our water supply is so important to national well-being that we think the Federal Government has a responsibility to encourage research in this field, research the need for which has been supported by many eminent scientists and politicians.

Members of the League of Women Voters have agreed that Federal, State, and local governments and private interests each has a responsibility for and should share in the cost of water resource planning and development. We are glad to see that title I, section 100(b) of this proposed legislation provides for Federal funds matched by funds from State or local government or private sources on a dollar-for-dollar basis.

League experience has given our members a belief in the efficacy of the grant-in-aid to increase investment of funds from other sources. We see no reason to doubt that Federal funds will lead other sources to increase investment in water research, particularly if the water research institutes which this bill will establish become centers attracting capable men and women and producing high-caliber work.

As mentioned in earlier testimony before this committee, the league is aware that specialists in the water field, especially competent research scientists, are in short supply. Federal financial aid to encourage the development of water research centers in a college or university of each State will indeed be seed money. Undergraduates today are searching for fields of specialization. Frequently the exposure to the interest and research of a professor is the stimulant the

student needs. Therefore the centers to be established by this legislation may well give many students the opportunity of seeing the possibilities of future careers in the water field.

We in the league are pleased to see that this bill suggests that social and political scientists may have a valuable contribution to make in water research. We do not wish to propose any changes in the legislation as it stands, but we hope that the committee report will put emphasis on this point. You gentlemen of this Senate committee will hear many eminent physical scientists and engineers stress the importance of expanding basic research and technology in these specialized fields. And important it is indeed.

But as the spokesman for the League of Women Voters, I would like to say that what bothers most citizens is not how to contain, purify, control, impound, or generate power from our water but what choice to make and whether there are suitable alternatives; not whether to make a choice between one large dam or several smaller ones, but possibly between a dam and something else—a better method of waste treatment or a natural recreation area; between the development of recreation or more irrigation or more industry. What are the economic effects? What combination of multipurpose installations will be best? Nowhere has there been consideration of a number of possible plans offering choice between real alternatives. For the research on which better water choices can be made, we need the economist, the statistician, the political scientist, as well as the engineers, the biologist, botanist, and geologist.

Senator Anderson, in his remarks introducing S. 2, mentioned his intention that the university centers should be established along these lines. I repeat, we hope the committee report will emphasize this intention.

The League of Women Voters is particularly aware of the importance of communication between specialists and citizens so that the discoveries of the one can be put into use through the interest and understanding of the other. One advantage of a water research institute eventually in every State will be the close association of laymen and specialists which is made possible when the professionals are close by and intimately acquainted with local conditions. These circumstances encourage communication.

A further encouragement would be the inclusion of communication experts and political scientists with other experts at these water institutions. Then methods may be developed to establish close rapport between the water consumers and the research experts in water resource development.

We hope too that the committee report may help to establish criteria for the projects to be undertaken. It would not be wise to make the bill too explicit but the report of the committee, we understand, has a binding effect on the executive agency responsible for administration. League members like to be sure that their tax money is used wisely. We would like to see in the committee report safeguards which will help insure that the financial aid goes to good projects, those which offer promise of greatest advance.

The suggestion that—

the service should use consultants and advisory boards to the fullest extent practical in identifying the research problems of most importance to be financed—

proposed by the Water Resources Committee of the Association of State Universities and Land-Grant Colleges merits attention. May I add support for spelling out that such advisory or selection committees also should be broad in composition and their members of recognized repute? Such a procedure would help to maintain citizen confidence in the quality of the sponsored projects and in the independence of the educational institutions.

The League of Women Voters is grateful for the opportunity to present its views to this committee. We hope that this proposed legislation will have a successful course through the Congress because we know that the need for water research is very great.

Senator Moss. Thank you very much, Mrs. Rosenblum, for that very fine statement and presentation of the position taken by the League of Women Voters. As always, you have some very constructive suggestions and we appreciate them very much.

Do you have any questions?

Senator METCALF. No questions.

Senator Moss. No questions. So thank you very much, Mrs. Rosenblum.

Mrs. ROSENBLUM. Thank you.

Senator Moss. Also a statement has been presented by Kenneth B. Pomeroy, chief forester of the American Forestry Association, and his statement will be made part of the record.

(The statement referred to follows:)

STATEMENT OF KENNETH B. POMEROY, CHIEF FORESTER, THE AMERICAN FORESTRY ASSOCIATION

The American Forestry Association wishes to submit the following statement in support of S. 2, the water resources research bill:

In October 1962 the American Forestry Association called together 40 of the Nation's leading conservationists. These men were assigned the task of drafting a comprehensive program for the intelligent use and management of natural resources on forests and related lands. These men represented every major segment of the entire conservation field. On the subject of water, they recommended:

"1. A continuing and more active program for the development and conservation of water supplies, including structures for the impoundment and transportation of water, and institution of forest and other vegetative management practices, where it has been demonstrated that greater and better timed water yields result and risks from erosion are minimal. To this end, research should be continued and intensified to determine the physical and economic consequences of programs of forest and other vegetative cover management.

"2. Research should be continued and intensified in the fields of weather modification, evaporation suppression and control of unnecessary losses from unproductive, water-wasting vegetation.

"3. Research designed to establish the relationship between land use practices and stream sedimentation should be carried forward to the point that the economic and conservation values of such practices can be appraised with reasonable accuracy.

"4. There should be active programs of physical science and economic research to establish practices and policies which will most effectively provide for pollution control and abatement."

The directors of the American Forestry Association endorsed the above recommendations at their regular board meeting on February 15, 1963. At the same time the directors endorsed the proposals contained in S. 2, the water resource research bill.

Senator Moss. This completes the list of witnesses who were scheduled to appear before this committee, and if there are no further matters to be heard, we will now stand adjourned.

(Whereupon, at 12:02 o'clock p.m., the hearing was adjourned.)

ADDITIONAL STATEMENTS AND COMMUNICATIONS

In accordance with permission previously granted, the following communications and statements received subsequent to the hearings on S. 2 are included in the hearing record:

U.S. SENATE,
Washington, D.C., February 25, 1963.

HON. CLINTON P. ANDERSON,
Chairman, Senate Committee on Interior and Insular Affairs,
Washington, D.C.

DEAR CLINT: As you know, a Senate assignment overseas made it impossible for me to testify in support of S. 2 when hearings were held earlier this month. I am therefore pleased as a cosponsor of the bill to have this opportunity to submit a written statement endorsing this legislation which will further stimulate our national water research program.

Cordially yours,

ERNEST GRUENING, *U.S. Senator.*

STATEMENT OF HON. ERNEST GRUENING, A U.S. SENATOR FROM THE STATE OF
ALASKA

Every available statistic indicates the severity of the water shortage which faces the Nation. Already some States have experienced the fears and frustrations arising from inadequate water reserves. I am pleased as one of the cosponsors of S. 2 to have the opportunity to endorse this legislation which will further stimulate our national water research program.

President Kennedy's task force on water resources has reported that water is being mined at an alarming rate throughout the Nation. Obviously such "mining" must be judicious. Waste must be eliminated. Water reuse methods must be found. Less expensive ways to desalinize ocean waters must be perfected. And water pollution must be ended.

These are major goals which the States cannot accomplish alone.

As a nation, we have come to realize that we are no longer blessed with the never-ending abundance which our forefathers found and too often wasted.

We have the opportunity to conserve our water resources. The tools of S. 2 would supplement rather than supplant the existing programs of the Federal agencies.

I approve of legislation which would make available to the State universities and colleges moneys which would establish within each State a water resources research institute, center, or equivalent agency. I support the use of matching funds available on a dollar-for-dollar basis to State water resources research institutes or centers "to meet the necessary expense of water resources research projects which could not otherwise be undertaken * * *."

In Alaska where a water pollution research laboratory is being located at the University of Alaska, in College, water research as it relates to the Far North is vital. The environmental studies planned at the State university will have far-reaching effects and will be of national and international interest.

The support envisioned in S. 2 will be helpful to the 49th State. Casual observers, I find, are likely to conclude that Alaska's water resources are unlimited. It is true that our coastline extends 34,000 miles, that we have thousands of lakes and streams and that the fifth largest river in North America, the Yukon flows across the top portion of the State.

It is also true that Alaska's usable water supply is limited. When U.S. Public Health Service employees examined the State's water they found that many of the streams were "fouled with glacial flour." They reported, too, that "extremely wide fluctuations in flow impose drastic limits on the usability of many other streams."

The extent of Alaska's ground water resources is unknown. It seems probable that the State will have to depend upon its surface waters for the majority of its water requirements. But research is necessary to determine the validity of such a probability.

Alaska will have, in future years, the industry it desires. Alaska also will have the problems which industry brings—such as stream pollution from pulp and paper mills. Alaska can better meet such challenges if it is armed properly.

NATIONAL SOCIETY OF PROFESSIONAL ENGINEERS,
Washington, D.C., March 1, 1963.

HON. CLINTON P. ANDERSON,
Chairman, Senate Interior and Insular Affairs Committee,
U.S. Senate, Washington, D.C.

DEAR SENATOR ANDERSON: There are several items upon which the National Society of Professional Engineers wishes to comment in connection with your Water Resources Research Planning Act (S. 2). The national society is a non-profit, membership organization composed of professional engineers in virtually every specialized branch of engineering practice and type of employment. All of the society's approximately 60,000 members are licensed under applicable State engineering registration laws, and are affiliated through 53 State and territorial societies and about 450 local community chapters. It is respectfully requested that the views and recommendations contained in this letter be made a part of the record of the hearings on your bill.

Following introduction of your bill, a report was sent out to all of the society's local chapters and State societies. Many of these chapters and State societies have continuing committees on water resources problems and proposals, composed of individuals highly knowledgeable in this most important, complex field. These State societies and local chapters were asked to submit their comments and recommendations to the headquarters of the national society so that they might be made available to you and your committee in considering recommendations and changes in the measure.

The National Society of Professional Engineers is keenly cognizant of the importance of the Nation's water resources. In order that these resources may properly be developed, utilized, and conserved within the national interest, the society approves the objectives of S. 2, but does have some reservations about the measure in its present form.

One of the principal concerns voiced by our State and local chapters is that the programs on the State level be closely coordinated with ongoing programs under the jurisdiction of many other Federal, State, and local agencies. While it is recognized that every State has problems in connection with water resources which are peculiar to that State or region, there is still, in many instances, a considerable degree of common problems with other jurisdictions. In addition, there is keen concern that programs developed and carried on in the State or regional institutes be of the highest possible quality, leading to the most efficient use of expenditures. An additional concern is that the program on the State level not be dominated by one particular discipline or segment of a State university or college to the detriment of the overall purposes of the program.

We believe that these principal concerns which were expressed by our constituent State and local societies may be resolved by the implementation of the following legislative amendment to the present bill:

NATIONAL ADVISORY COMMITTEE ON WATER RESOURCES

It is recommended that the enabling legislation provide for a National Advisory Committee on Water Resources composed of engineers, scientists, and members of other disciplines concerned with water resources research which would advise the Secretary of Interior on the types, coordination, and management of programs to be conducted. This Committee would also be charged with advising the Secretary on necessary administrative guidelines, directives, and other matters of policy in connection with the overall objectives and purposes of the act. Language should be so drafted as to permit the establishment of additional committees to be charged with specific studies and projects.

While Secretary Udall has indicated his intention to administratively provide for such an advisory council and to consult with various experts, there appears to be little reason for objection to the establishment of a legislative mandate to effect this result. As we all are aware, administrators come and go, but if a sound long-range Federal program is to be developed, the enabling legislation should be equally sound and provide for unanticipated eventualities. The Department of Interior has advised (informally) that they would have no objection to the legislative requirement herein recommended.

It is respectfully submitted that the adoption of this recommendation will be in accord with the overall objectives of the proposed act and strengthen its administration. We have taken the liberty of drafting an amendment regarding the establishment of an Advisory Committee, which is attached to this letter.

If we may be of further assistance to you in any manner, please do not hesitate to contact us.

Very truly yours,

PAUL H. ROBBINS, *P.E., Executive Director.*

PROPOSED AMENDMENT OF THE NATIONAL ADVISORY COMMITTEE ON WATER RESOURCES

SEC. —. (a) There is hereby established in the Department of Interior a National Advisory Committee on Water Resources (hereinafter referred to as the "Committee"). The Committee shall consist of the Secretary, who shall be Chairman, and twelve persons appointed without regard to the civil service laws by the Secretary. The membership of the council shall contain representation from engineering, scientific, and other interested professions concerned with the development of water resources.

(b) Appointed members of the Committee, while attending meetings of the Committee or while otherwise serving at the request of the Secretary, shall be entitled to receive compensation at a rate to be fixed by the Secretary, but not exceeding \$75 per diem, and shall also be entitled to receive an allowance for actual and necessary traveling and subsistence expenses while so serving away from their places of residence.

(c) The Secretary may appoint such special advisory and technical committees as may be useful in carrying out his and the Committee's functions under this title.

(d) The Committee shall—

(1) Advise, consult with, and make recommendations to the Secretary on matters of basic policy arising out of the administration of this Act;

(2) Consult with the Commissioner in the formulation of all regulations, standards, and criteria promulgated by him in carrying out this Act; and

(3) Perform such services as the Secretary may delegate to it.

(e) The Secretary may utilize the services of any member or members of the Committee in connection with matters relating to this Act, for such periods, in addition to conference periods, as he may deem appropriate.

WESTERN WASHINGTON STATE COLLEGE,
DEPARTMENT OF BIOLOGY,
Bellingham, Wash., February 27, 1963.

Re Lake Whatcom study project.

HON. CLINTON P. ANDERSON,
U.S. Senate, Washington, D.C.

DEAR SIR: We were most pleased to read recently of your bill for Federal support of basic water research. We would certainly rise to second the statements of Mr. Jerome B. Wiesner quoted in the enclosed newspaper clipping. This bill is not only timely from the standpoint of national well-being but would also serve to complement some of the work which is being done here in Washington on both local and State levels. On April 1, 1962, the city of Bellingham entered into an agreement with the undersigned of the Biology Department of Western Washington State College to make a complete limnological investigation of Lake Whatcom, our city reservoir. Several factors prompted us to undertake this investigation. In the first place this lake is large, approximately 12 miles long, averaging a mile in width, and has a mean depth of about 150 feet. It has been used for many years as a center of recreation, as well as for the reservoir of industrial and domestic water supply. In the past it has been used quite extensively in the lumbering industry with at one time 11 sawmills located on the lake. With the increase in demands for water for both industrial and domestic needs, the Water Board of the City of Bellingham took the very bold step of providing for the diversion of water from the Middle Fork of the Nooksack River some 20 miles distant through a pipeline into Lake Whatcom. With this, the lake level can be maintained, and adequacy of water supply is insured. The introduction of this water from a new source coincided with the unique granting by the city of money for basic limnological research on Lake Whatcom. Probably the most unique feature in this agreement between the city and Western Washington State College was that there was no serious pollution problem in the lake at the time. It was the desire of the members of the water board simply to find out all that they could about their reservoir.

Lake Whatcom is divided into three distinct depressions; that is, there are three regions to the lake which are quite distinct from one another in a number of ways. The differences between the various parts of the lake are so great, in fact, that under some systems of classification these various regions would fall into different lake categories. Some of our findings concerning the amount of dissolved oxygen at various depths and various regions of the lake have already been used in support of measures to move the water supply source for one of the State fish hatcheries. Our work on coliform analysis has shown that much of the lake is quite free from human fecal pollution but that there are certain regions that bear close watching. Since the new source of water—the Nooksack River—was from an area of glacial melt, we were prompted to undertake investigations of the microchemical variations in water quality and the effects these might have on plants and animals in the lake. We are conducting a qualitative and quantitative study of the radioisotopes present both in the water from the Nooksack River and from the bulk of the lake.

The initial grant from the city was for \$3,700. With this and with whatever other resources—volunteer help, equipment loans, etc.—we could tap, we were able to complete the first year of our study. Recently, the city water board allocated \$8,000 to continue support for our project for an additional year. The second year's grant was given with the firm understanding that after April 1, 1964, our project would rely on support from other sources. It should be pointed out here that we have obtained assistance gratis in the nature of laboratory analyses from the University of Washington and from the Washington State University.

We have submitted one report thus far to the city of Bellingham giving findings of our first half year of study and are in the process now of preparing our first annual report. The Washington State Pollution Control Commission has agreed to publish the results of the first year of our study and has expressed a very strong interest in our project. The assistant director of the Washington State Pollution Control Commission has approached us casually in regard to the possibility of our doing contract work for limnological investigations for other lakes in the region. We are not in a position to undertake such endeavors at the present time, but this request certainly fits in with our long-term plans. It is our intent to establish here at Western Washington State College a center for limnological studies.

We anticipate that when a center for the study of water is established in Washington—as indeed a center must be established, hopefully, through the mechanics of your bill—we may be competing with other State institutions of higher education for its location. Our interest in establishing the center here at Western does not stem from idle dreams, however. Western Washington State College is the fastest growing of the State colleges, and our department has for many years emphasized the ecological approach to the study of biology. Our campus is ideally situated for such an approach, of course—only a few minutes from salt water, and we can travel to the foot of a glacier within an hour and a half. Fresh water and estuarine situations of all sorts abound within a 50-mile radius of the campus. We are strategically located also, about halfway between the Universities of Washington and British Columbia.

The foregoing comments, we hope, will serve to emphasize our strong support for your measure. We would appreciate receiving a copy of the bill as soon as it is available. If there is any way in which we might assist you in support of passage of this bill, please do not hesitate to call upon us.

Sincerely,

GERALD F. KRAFT,
Instructor of Zoology.
CHARLES J. FLORA,
Associate Professor of Zoology.

[From the Bellingham Herald, Feb. 22, 1963]

JFK'S SCIENCE ADVISER URGES CONGRESS TO PROVIDE MONEY FOR BASIC WATER RESEARCH

WASHINGTON (UPI).—President Kennedy's Science Adviser went to Capitol Hill today to urge Congress to provide money for basic water research in special centers throughout the Nation.

Jerome B. Wiesner appeared before the Senate Interior Committee in behalf of a bill written by Senator Clinton P. Anderson, Democrat, of New Mexico.

"The water resources problems facing the Nation are of such scope and complexity as to justify immediate steps to broaden and strengthen research on those problems," Wiesner said. He added there was a "need to enlist and increase combined efforts of scientists, engineers, economists, and other scholars for research and graduate education in the several disciplines underlying water resources."

Wiesner said nature blessed the country with an abundance of water. But he added that variations in geographical distribution and rapid population growth and industry expansion "have combined to pose mounting problems of availability of water of adequate quality."

"Consequently, the development of water resources has become one of the largest single activities in the United States," he said. "Water resource development, encompassing all sectors of society, presently involves an expenditure of about \$10 billion every year, and the rate is rapidly increasing."

But too small a fraction of this yearly investment is devoted to research. Wiesner said research needs ranged from basic research on the nature of water to studies in the social sciences with respect to management of water resources.

"If we are to make headway in anticipating and ameliorating water shortages, it is necessary to develop and mobilize the scientific and technical capabilities of our research institutions, Federal and State, public and private," Wiesner said.

Anderson's bill seeks to provide up to \$100,000 for each State to set up a water research center. It also would authorize \$5 million annually in matching funds for the States to use in water research, and \$10 million a year in grants-in-aid to universities, colleges, and research centers.

Aims of the Anderson bill, introduced shortly after Congress convened, anticipated recommendations in a special water message the President sent to Capitol Hill Monday.

SOUTH DAKOTA STATE GEOLOGICAL SURVEY,
Vermillion, February 26, 1963.

HON. GEORGE MCGOVERN,
U.S. Senate, Washington, D.C.

DEAR SENATOR MCGOVERN: I certainly appreciate the opportunity to have been able to discuss with you on February 19 the Anderson bill (S. 2) which would establish water resources research centers. I also appreciate your taking such an interest in this type of legislation, which will be of such great importance to us in South Dakota as well as in other parts of the Nation.

Although agreeing with the principle of S. 2, I should like to repeat my concern about certain parts of the bill.

We all agree that water problems are going to loom as an increasingly important part of our life in the future, and will govern in large measure the growth and development of all parts of the Nation. We will also agree that research on water problems is badly needed—Secretary Udall stressed this point in the hearings when he stated that only 0.75 percent of the total being spent on water projects is earmarked for research, as opposed to the 3 to 5 percent which "industries" spend. I have seen elsewhere that the figures are 0.5 percent compared with 2 percent; although the numbers differ, the ratio tells the sad story: We are spending for water research at the rate of only one-fourth as much as is being spent on research in all other fields.

(1) Now that the need for research is established, who is going to do it? This, I feel, is one of the major modifications that I would suggest for bill S. 2. It should give greater emphasis to the training of personnel. This would result in more men being available to do the research—thus, more research and better research accomplished. In emphasizing the training aspect, research could be initially related to the teaching field—research for theses in conjunction with their attaining the academic degrees. Then, when more manpower becomes available in the water field, increased emphasis on research would be a more fruitful expenditure of money. You will recall that Secretary Udall agreed with your views when you expressed this sentiment at the hearing.

(2) Another major flaw in the bill, it seems to me, is that it does not make adequate provision for existing water research that is being carried out by existing Federal and State agencies, such as the U.S. Geological Survey or the South Dakota Geological Survey. Thus I feel that the language should be strengthened in title III, sec. 300 (line 25 on p. 8 and lines 1–2 on p. 9) and sec. 301 (line 3 on p. 10) to provide not only for lack of duplication, or diminishing

existing authorities on responsibilities, but to go further and stress that such Federal and State agency activities should be increased.

(3) Another great fear that I have is that the program will be so fragmented, with one institute being established per State, plus at least an equivalent amount of money available for research at other schools in that State, that not as significant results will be accomplished as if only a relatively few (say 10 to 15) institutes were thus supported initially. This would permit better coordination of research activity, would result in awards going to institutes or institutions which have a significant number of trained personnel, and would permit guidelines to be established for the possible later expansion of this activity into every State. Actually, after the first few trial years of the program, it may be concluded that it would be less economic to have such institutes in every State but rather that regional institutes such as those mentioned in the bill would function best in some parts of the Nation.

(4) I feel that it is of great importance to insure that the collection of basic data be continued as a major effort of the Federal agencies so doing. (U.S. Geological Survey is the major one.)

(5) I think it important that research be carried on in two different areas—basic (or fundamental) research and applied research. The latter usually has an immediate application to administration and regulation, although it depends for its efficiency and success on the former. Thus, I would suggest an added section under title III to stress this need.

Now, I should like to comment on the testimony given by the representatives of the State land-grant universities and colleges on the afternoon of February 19.

President Elkins, of the University of Maryland, stressed the need for manpower for research and teaching, and I obviously agree wholeheartedly with him.

However, I must disagree vociferously with the comments of President Aldrich, of California, on this same subject. His argument was most persuasive and beautifully expressed; in fact, it has been a long time since I have heard as eloquent a statement as the testimony of Dr. Aldrich. Nevertheless, despite what Dr. Aldrich said, adequately trained personnel for a water research program as provided for in bill S. 2 are not available presently at the State land-grant universities and colleges, or anywhere else on the scale called for by S. 2. A few are present at universities and colleges, and many more exist in the Federal and State water research agencies, but they must not be pirated.

Furthermore, if Dr. Aldrich would provide these research personnel from positions they are currently occupying at the schools, what is to become of the work that they formerly did? Is it so insignificant that it can be relegated to a state of suspended animation?

And last, I do agree with Dr. Aldrich on his reply to Senator Moss' query as to why not concentrate the expanded research activity in the existing Federal agencies rather than the States. Dr. Aldrich's reply, as you recall, was that "genius is where you find it," and he expanded his answer to say that the scientists in the Federal scientific groups are not reproducing their kind, as is a teacher at a university. And that the fresh, untrammled young minds are more venturesome at questioning established principles and scientific authority, and that this exchange of student and professor has greater chance of uncovering new principles, new ideas. I am sure that, as a former professor at Dakota Wesleyan, that you will agree, as do I.

In summary then, bill S. 2 is a move in the right direction, but I urge that it be modified in at least five major ways:

(1) Training of research workers in water resources is of primary importance, not secondary.

(2) The importance of existing research in water resources by existing Federal and State agencies should be stressed.

(3) Institutes should be established initially at only selected schools, rather than by using the scattergun approach.

(4) Increased effort in the collection of basic data (especially by Federal and State agencies already active in this process), as a basis for research ideas and experimentation, should be specified.

(5) The difference between basic and applied research should be recognized, and adequate provision should be made for the former, lest the more striking and newsworthy results of the latter cause basic research to be overlooked.

(6) An adequate supply of trained personnel is not available (despite President Aldrich's statement to the contrary), and must be provided for. (See par. (1), above.)

(7) Research work should not be concentrated in the Federal or State agencies, but must be carried out in increasing amounts at selected schools more adequately equipped and staffed than others. Certainly, this should not need to include at least one school in each State, and it even more emphatically should not be confined to land-grant institutions. I would remind President Aldrich that his statement "genius is where you find it" is true, and that such genius also exists in State or private universities or colleges that are not land-grant ones.

Again, I appreciate the opportunity to have been able to discuss some of my views with you at the time of the initial hearings on bill S. 2, and the opportunity to elaborate on them herein.

If there is further information that you wish regarding this matter, I shall be glad to try to supply it.

Sincerely yours,

ALLEN F. AGNEW, *State Geologist.*

STATE OF ILLINOIS,
STATE WATER SURVEY DIVISION,
Urbana, February 28, 1963.

HON. CLINTON P. ANDERSON,
*Chairman, Committee on Interior and Insular Affairs,
U.S. Senate, Washington, D.C.*

DEAR SENATOR ANDERSON: This letter relates to Senate bill 2, 88th Congress, 1st session, known as the Water Resources Research Act. I am writing as president of the section of hydrology and chairman of the committee on status and needs in hydrology of the section of hydrology of the American Geophysical Union. This committee is composed of the leading hydrologists in this country. Meeting in Chicago on February 13-15, 1963, this committee adopted a position in opposition to S. 2 which is incorporated in this letter. Appended to this letter are statements of position on other mechanisms related to the advancement of the science of hydrology which are currently also under active discussion in this country, and in the committee membership.

The committee on status and needs in hydrology concurs in the great need to accelerate both research and education in the water sciences. It believes that only through this fundamental approach will we ultimately achieve the new body of knowledge and the competence to meet the challenge facing this Nation and the world in making efficient and maximum beneficial use of its water resources.

Therefore, the committee concurs in the need and the urgency regarding water sciences which you have so well expressed. It also agrees with the necessity of looking to our universities as the principal mechanism through which these needs can be met, and to the necessity of increased Federal support.

The committee also wishes to congratulate you in your great interest in this matter and also the manner in which the earlier version of S. 2 was introduced last July. This action certainly has promoted widespread interest and discussion which has been wholesome. It is therefore with some regret that we oppose S. 2 in its present form. I shall try to convey some of our thinking as developed in extensive discussion.

Although the success of the land-grant college approach in agriculture cannot be denied, it does not necessarily follow that this approach—100 years later and in a different area—is right for water resources research. For one thing the establishment of 50 water resources centers does not mean that only 50 would exist. A number of universities, not in the land-grant or even the State university systems, presently are prominent in water research and should be encouraged to so continue. We might name Stanford University, Johns Hopkins, Harvard, MIT, and the California Institute of Technology to mention but a few of more than a dozen such universities. There are other State or independent institutions such as the Desert Research Institute, the Illinois State Water Survey, Battelle Institute, and others which are widely recognized as centers of hydrologic research. Of course, there are literally dozens of research centers and laboratories carrying on hydrologic research in such Federal agencies as the Agricultural Research Service, the Forest Service, the Public Health Service, and the U.S. Geological Survey. With the additions consequent to S. 2, therefore, there would be more than a hundred centers of hydrologic research which we believe is more than we require or can afford. By "afford" is meant not only dollars but competent talent to staff.

Discussions indicate that in many instances it will be very difficult for the State Governors or legislatures to determine which university should be the center. As a matter of fact, it can be safely predicted that despite your very best intentions there will be much controversy over who receives these funds—both because of the money involved as well as the prestige.

As you will note from the appended material, the committee on status and needs in hydrology has a great deal of confidence in existing granting agencies of the Federal Government; for example, the National Science Foundation. We believe the NSF is well aware of the needs for greatly expanded research in hydrology, and if adequately funded, will support worthy proposals which will lead to expanded education and research in this field. The system of project justifications, review, and reports which they employ, as does the National Institutes of Health and other organizations, are very wholesome. These prevent the deadwood and inactive projects which exist only on paper when an assured annual appropriation is available.

The complete statement of the committee on status and needs in hydrology follows. Other actions and the committee membership are appended.

"This committee strongly favors increased Federal support of education and research in hydrology and water resources.

"The committee desires action that will emphasize increased Federal support for training and education of water resources personnel and for water resources research. This support may well be administered by the National Science Foundation and other appropriate Federal agencies. We believe that institutions with established or immediately potential programs and capabilities should be the initial recipients of such support.

"The committee opposes enactment of Senate bill 2 and its companion bill in the House (88th Cong., 1st sess.) in their present form because the provisions of this bill do not allow adequate measures of economy and efficiency. With this in mind, the committee urges the president of the Hydrology Section, American Geophysical Union, or his designate to convey these views to the appropriate congressional committees."

Very truly yours,

WILLIAM C. ACKERMANN, *Chairman.*

STATEMENT OF AMERICAN GEOPHYSICAL UNION, SECTION OF HYDROLOGY, COMMITTEE ON STATUS AND NEEDS IN HYDROLOGY, REGARDING INSTITUTIONS AND MECHANISMS, ADOPTED FEBRUARY 15, 1963

The Committee on Status and Needs in Hydrology of the Section of Hydrology, American Geophysical Union, meeting in Chicago on February 13-15, 1963, has considered alternative institutions and mechanisms to advance national and international programs of education, research, planning, and operations relating to hydrology.

The committee has studied and discussed the background and problems related to a number of subject areas and concurs on each as stated below. The committee recommends that immediate steps be taken to place in operation the specific actions herein included:

(A) JOURNAL DEVOTED EXCLUSIVELY TO HYDROLOGY

The committee believes that there is a need for a new journal dealing exclusively with hydrology.

We propose that the new journal be entitled "Hydrology," a name that has the elegance of simplicity and completeness. We believe that words such as "journal" or "sciences" are unnecessary, and that terms such as "research" may be unnecessarily limiting or restrictive, as there is considerable desire for an outlet for papers of an applied and descriptive nature.

We propose also that high standards of scientific quality be maintained, and that the subject matter deal with hydrology as a geophysical science including the applied phases.

We propose that action on this journal be contingent on the recommendation of the subcommittee established to consider the "American Hydrological Society."

The American Geophysical Union serves hydrology as a meeting ground for scientists who have their backgrounds in diverse fields and who carry out their research in different parts of the hydrologic cycle.

We believe that the present Journal of Geophysical Research does not adequately fulfill the needs. Hydrological papers are lost in its title and lost in its

bulk. This situation has tended to discourage the publication of hydrologic papers in the Journal of Geophysical Research so most hydrological papers now appear in several other journals. Hence the American Geophysical Union is rapidly losing its effectiveness as a cohesive force in hydrology.

We believe that the new journal would provide needed visibility and focus for hydrology. We are convinced that the proposed journal would elicit a renewed flow of significant papers toward the AGU and lead toward increased membership among the many hydrologists engaged in vast programs of water resources development. Moreover, the identification afforded by a new journal would help attract competent talent to this growing field and would enable the AGU to keep pace with the resurgence in hydrologic research.

Further, we believe that the Journal of Geophysical Research should continue as the place of publication of broad interdisciplinary papers, and that it is essential to retain our association with and interest in geophysics both to provide the proper development of hydrology and to maintain our comprehensive understanding of the earth.

(B) AMERICAN HYDROLOGICAL SOCIETY

The committee considered the advisability of organizing a professional and scientific society as a means of advancing and gaining recognition for hydrology.

Although there is much to be gained through establishment of a society dedicated to a specific field, there are adverse aspects which cannot be overlooked. Therefore, the president of the section of hydrology is urged to appoint a subcommittee to give the matter full consideration. It is requested that this subcommittee render a report at the next meeting of the committee on—

(1) The feasibility of achieving greater autonomy and recognition for hydrology within the structure of the American Geophysical Union and the extent to which the needs for a professional-scientific society could be met within the union; and

(2) The feasibility and desirability of creating a separate society for hydrology at an appropriate time in the future.

(C) UNIVERSITIES COUNCIL ON HYDROLOGY

The committee unanimously endorses the universities council on hydrology in its objective of fostering and furthering education and research in the field of hydrology.

The growing importance of water resources both nationally and internationally requires that education and research programs be augmented and strengthened in the immediate future. We believe that the UCOH should be responsive to the needs of public agencies and private organizations concerned with the broad field of hydrology. Further, we believe that the activities and programs of UCOH should be coordinated with those of the Section of Hydrology, American Geophysical Union.

(D) ORGANIZATION FOR ADMINISTRATION AND HYDROLOGICAL PROPOSALS IN THE NATIONAL SCIENCE FOUNDATION

The committee believes that—

(1) The present organization of the National Science Foundation is adequate to process the hydrological research proposals submitted at the present time.

(2) The number of proposals at present is too low in relation to the hydrological research needs. A clear, forceful statement of research needs and opportunities should be prepared to promote the hydrological program of the National Science Foundation.

(3) The National Science Foundation should facilitate and stimulate the development of basic hydrological research by (a) supporting on an expanding basis the development of faculties, students, and facilities in educational institutions concerned with research and education in hydrology; and (b) the recognition of hydrology as an identifiable entity within the National Science Foundation.

(E) HYDROLOGY COMMITTEE IN NATIONAL ACADEMY OF SCIENCES

The committee recognizes the important need for a committee on hydrology and recommends that the president, Section of Hydrology, American Geophysi-

cal Union, contact the Chairman, Earth Sciences Division, National Research Council, with a view to formation of a Committee on Hydrology within the framework of the National Academy of Sciences-National Research Council.

(F) WATER RESOURCES RESEARCH INSTITUTES

This committee strongly favors increased Federal support of education and research in hydrology and water resources.

The committee desires action that will emphasize increased Federal support for training and education of water resources personnel and for water resources research. This support may well be administered by the National Science Foundation and other appropriate Federal agencies. We believe that institutions with established or immediately potential programs and capabilities should be the initial recipients of such support.

The committee opposes enactment of Senate bill 2 and its companion bill in the House (88th Cong., 1st sess.) in their present form because the provisions of this bill do not allow adequate measures of economy and efficiency. With this in mind, the committee urges the president of the Hydrology Section, American Geophysical Union, or his designate to convey these views to the appropriate congressional committees.

(G) INTERNATIONAL MECHANISMS FOR FORMULATING AND CARRYING OUT THE PROGRAM OF THE INTERNATIONAL HYDROLOGICAL DECADE

The committee expresses its deep and active interest in the concept of an international program in scientific hydrology. In furtherance of this program it is resolved that the President appoint a subcommittee to represent our interests on a continuing basis between assembled meetings.

We further request this subcommittee to convene at the earliest possible opportunity and as may be needed in the future to represent and convey the interests and views of the committee. It shall also be the responsibility of the subcommittee to inform the committee of activities, actions, and mechanisms related to the international hydrological decade.

(H) COMMITTEE ON STATUS AND NEEDS IN HYDROLOGY

The committee recommends that its chairman seek financial support from appropriate sources to permit the committee to meet again to address itself to an overall evaluation of the status and needs of hydrology.

AMERICAN GEOPHYSICAL UNION, SECTION OF HYDROLOGY, COMMITTEE ON STATUS AND NEED IN HYDROLOGY, IN ATTENDANCE AT SECOND CONFERENCE OF AMERICAN HYDROLOGISTS

William C. Ackermann, chairman, Illinois State Water Survey, Urbana, Ill.

Henry W. Anderson, California Forest and Range Experiment Station, Berkeley, Calif.

James A. Bender, Chief, Research Division, U.S. Army Cold Regions Research and Engineering Laboratory, Corps of Engineers, Hanover, N.H.

Dr. W. E. Benson,¹ National Science Foundation, Washington, D.C.

Prof. George S. Benton, Department of Mechanics, Johns Hopkins University, Baltimore, Md.

Dr. Paul Bock, Hydrology and Water Resources Division, Travelers Research Center, Hartford, Conn.

Dr. Norman H. Brooks, Hydrodynamics Laboratory, Massachusetts Institute of Technology, Cambridge, Mass.

Dr. Ven Te Chow, University of Illinois, Urbana, Ill.

Dr. N. A. Christensen, College of Engineering, Cornell University, Ithaca, N.Y.

Robert H. Clark, Hydraulics Division, Department of Northern Affairs and National Resources, Ottawa, Ontario, Canada.

Dr. Robert E. Dils, College of Forestry and Range Management, Colorado State University, Fort Collins, Colo.

Leonard B. Dworsky, U.S. Public Health Service, Washington, D.C.

¹ Consultant to the 2d Conference of American Hydrologists.

William O. Field, American Geographical Society, New York, N.Y.
 Lloyd L. Harrold, research project supervisor, Agricultural Research Service, Coshocton, Ohio.
 John W. Harshbarger, Department of Geology, University of Arizona, Tucson, Ariz.
 William E. Hiatt, Hydrologic Services Division, U.S. Weather Bureau, Washington, D.C.
 Edward A. Johnson, Central States Forest Experiment Station, U.S. Forest Service, Columbus, Ohio.
 Dr. Don Kirkham, Department of Agronomy, Iowa State University, Ames, Iowa.
 Victor A. Koelzer,² Harza Engineering Co., Chicago, Ill.
 Max A. Kohler, Division of Hydrologic Services, U.S. Weather Bureau, Washington, D.C.
 Walter B. Langbein, U.S. Geological Survey, Department of Interior, Washington, D.C.
 Dr. Luna B. Leopold, U.S. Geological Survey, Department of Interior, Washington, D.C.
 Ray K. Linsley, Department of Civil Engineering, Stanford University, Stanford, Calif.
 Dr. George B. Maxey, Desert Research Institute, University of Nevada, Reno, Nev.
 Dr. Mark F. Meier, U.S. Geological Survey, Tacoma, Wash.
 Dr. Raymond L. Nace, U.S. Geological Survey, Department of Interior, Washington, D.C.
 H. O. Ogrosky, Chief, Hydrology Branch, Soil Conservation Service, U.S. Department of Agriculture, Washington, D.C.
 Dr. Sverre Petterssen,¹ Department of Geophysical Sciences, University of Chicago, Chicago, Ill.
 Harman F. Smith, Illinois State Water Survey, Urbana, Ill.
 Franklin F. Snyder, Office of Chief Engineer, Corps of Engineers, U.S. Army, Washington, D.C.
 Waldo E. Smith, ex officio, American Geophysical Union, Washington, D.C.
 Kenneth C. Spengler,¹ American Meteorological Society, Boston, Mass.
 Dr. David K. Todd, Department of Civil Engineering, University of California, Berkeley, Calif.
 Dr. Harold E. Thomas, U.S. Geological Survey, Menlo Park, Calif.
 Dr. C. H. M. van Bavel, chief soil scientist, U.S. Water Conservation Laboratory, Tempe, Ariz.
 Dr. Cecil H. Wadleigh, Director, Soil and Water Conservation Research Branch, Agricultural Research Service, Beltsville, Md.
 Dr. H. G. Wilm,² commissioner, Department of Conservation, State of New York, Albany, N.Y.
 Ralph N. Wilson,² Office, Chief of Engineers, Corps of Engineers, Civil Works, Washington, D.C.
 Walter T. Wilson, Hydrologic Services Division, U.S. Weather Bureau, Washington, D.C.
 Dr. M. Gordon Wolman, Department of Geography, Johns Hopkins University, Baltimore, Md.

SOUTH DAKOTA STATE COLLEGE,
 DIVISION OF AGRICULTURE,
Brookings, S. Dak., February 15, 1963.

HON. GEORGE MCGOVERN,
U.S. Senate, Washington, D.C.

DEAR SENATOR MCGOVERN: The legislation proposed in Senate bill 2 could have far-reaching implications on the development of the Nation's water resources. The bill patterns a program comparable to two time-tested acts, the Hatch Act and the Smith-Lever Act, which have so effectively complemented the program envisioned by the Land Grant College Act of 1862.

The principle of decentralizing research among the several States is a basic tenet of S. 2 and of the Hatch Act. I believe in this philosophy because it provides a means whereby research in the field of water resource development can be done under a wide range of problem areas. Furthermore, such a program

¹ Consultant to the 2d Conference of American Hydrologists.

² Unable to be present at 2d Conference of American Hydrologists.

will stimulate the training of scientists as a byproduct of the research programs in the several land-grant colleges. The bill makes provision for overall coordination of the research program between the States and departments of the Federal and State governments—a precedent successfully established by the land-grant colleges and the Department of Agriculture. More research undertakings require an interdisciplinary approach which is available on college and university campuses. It would seem that this kind of an approach would have a salutary effect on research progress in a field so complex as that of water resource development and conservation. I am particularly pleased that specific provisions have been made in section 104 of the proposed act that direct coordination of the research with State water resource research agencies. This is most important if we are to develop a research program in a given State geared to the needs and opportunities within a State.

South Dakota State College is actively concerned with the development of our water resources. Our problems are characteristic of those indigenous to the Great Plains area and include the variability of rainfall as it threatens the economic stability of the region's major industry—agriculture. Besides an inadequate supply of water, the quality of water available to municipalities is poor and frequently hampers urban and industrial growth. Fluctuating water supplies interfere with the State's future development of recreational areas and profitability of converting land from agriculture to other uses such as recreation. We look at water resource development as one of the tools for increasing the employment opportunities for young people within the State.

For these reasons South Dakota State College has committed resources to research, teaching, and extension programs that are related to water resource development. We are limited in funds and personnel but, given additional support, we could expand our research into such areas as evaporation reduction, desalinization of water, the development of small-scale water treatment facilities, and expanding studies on the improved utilization of water in agriculture. We now have work in process at several locations with the experiment station. These include Newell, Redfield, and Centerville, in addition to field and laboratory studies here at Brookings.

The resources of the extension service have been and will continue to be committed to educational programs aimed at assisting people organize sub-conservancy irrigation districts and watershed development projects. The interest of people of our State in water resource development is indicated by the overwhelming vote to organize and tax themselves for these developments. We heartily commend you for cosponsoring S. 2. If the legislation and the bill are enacted, it will enable South Dakota State College to expand and carry on greatly needed research programs from which will come results of importance to the future of our State and Nation.

Sincerely yours, .

ORVILLE G. BENTLEY,

Dean, Division of Agriculture, and Director of Experiment Station.

STATEMENT OF THE AMERICAN FARM BUREAU FEDERATION, JOHN I. TAYLOR,
ASSISTANT LEGISLATIVE DIRECTOR, FEBRUARY 26, 1963

Water—one of the vital elements necessary to sustain life—is the general subject of the legislation proposed in S. 2. Farmers and Farm Bureau are very interested in water and in its future capabilities. Research in this field, compared to the extent this bill proposes, has been quite limited. The exploration of the many phases of water should have a great influence on its future use—its attainment—its disposition.

While much work has been done on its handling and conservation, even these factors need further research.

This bill S. 2 proposes to establish water research centers at land-grant colleges and State universities, to stimulate water research at other colleges, universities, and centers of competence, and to promote a more adequate national program of water research.

At our latest annual meeting, held in Atlanta, Ga., on December 12–14, 1962, we said:

“We favor a continued and expanded research program on conversion of saline water, air pollution, water and soil conservation, drainage, forestry manage-

ment, restoration of strip mining areas, and other natural resource problems, within the present framework of Federal-State-private cooperation."

We further said: "The Government must exercise strict economy, eliminate duplication, and promote efficient operations."

In view of these policies, the American Farm Bureau Federation is in general support of the ideas and principles contained in S. 2. However, we wish to suggest some thoughts for amendments to improve the measure.

1. We feel this bill, as drawn, would make funds available to every college in every State. This would lead to such a diffusion of funds as to prohibit any real, effective research to be done by any college or university. We believe these funds should be allocated to the States on a matching basis for the purpose of establishing one water research center at the land-grant college or where there is no land-grant college—at one college or university, designated by the State.

The land-grant colleges, through their experiment stations, are eminently prepared and qualified to undertake this work.

2. We believe further there is too much opportunity for duplication of effort in water research in this bill. We suggest a committee composed of people from the designated colleges and universities to screen and allocate the various phases of proposed research work to assure no duplicated effort.

3. The report of the Senate Select Committee on National Water Resources recommended as follows: "Third. The Federal Government should undertake a coordinated scientific research program on water." While the information and facts contained in this report are excellent and complete, we do not agree with this recommendation. The Federal Government is not a research agency and should not be made into one. There should be, of course, provision for loans or grants to private institutions and individuals to pursue water research, but this work also should be coordinated with the work done by colleges and universities.

The committee and the Congress should make certain that the program contemplated under titles II and III of the bill are fully in accord and not duplicated by that contemplated under title I.

4. Funds are always a problem, and we consider research in the field of water a very high priority. We cannot, however, recommend this or any other program except within the framework of a balanced budget. We therefore respectfully urge the committee and the Congress to cut other proposed expenditures to make possible this important work.

We shall make specific recommendations for budget adjustments when we appear before the Appropriations Committees of the Congress.

This is indeed a world of reality—it is real to those who do not have enough water or good water now. It will become more real to those whose water is diminishing and polluting to a marked degree. But, it is also very real to all our citizens as they consider the stability of our currency, the value of our money, and the respect of the free world. These can only be maintained within the purview of a balanced economy.

We support the passage of S. 2 and urge the committee to give credence and action to these suggestions.

STATEMENT OF J. W. CORNWALL, FAIRFIELD, WASH., CHAIRMAN, RESEARCH COMMITTEE, NATIONAL ASSOCIATION OF SOIL AND WATER CONSERVATION DISTRICTS

There is virtually unanimous agreement by all the responsible agencies and authorities in the field of water that the water supply needs of the United States are going to increase sharply and continuously in the years ahead. Conservation and wise management of the available supplies are imperative if we are to have enough water for our essential uses during the remainder of this century and in the period thereafter. Potential additions to the available supply need to be developed, waste must be materially reduced, and capabilities for reuse substantially increased.

The attainment of these vital objectives will require improved knowledge in many fields—economic as well as physical, social as well as political. The need for research in all of these fields bearing on the water problem has been amply justified by extended analysis and hearings by competent authorities. The investigations of the Nation's water problems have also made clear the oncoming need for a larger body of well-qualified personnel in the various key areas of water resources conservation, development, and use.

The enactment of S. 2 would contribute in an important way to the accomplishment of these necessary water knowledge, research and personnel objectives.

The National Association of Soil and Water Conservation Districts (NACD) is vitally concerned with the conservation, development, and use of water supplies—and with those disciplines which can contribute to the quality, quantity, and availability of supplies. This association, jointly with the National Reclamation Association, sponsored a National Water Research Symposium in Washington, D.C., March 28-30, 1961, for the specific purpose of acquainting the general public with the seriousness of the problem and to help focus attention upon the need for a more adequate research program.

At that time we pointed out that "research is the key to the solution of the water problem, but it is generally agreed that our present water research program is entirely inadequate to meet the many and diverse water situations which are developing so rapidly."

The symposium, participated in by many of the Nation's most distinguished water authorities, underscored again the increasing dimensions of the total water problem, and the critical need for moving ahead with an enlarged and comprehensive program of water research.

At the recent annual convention of the National Association of Soil and Water Conservation Districts in Denver, February 3-7, 1963, our council endorsed in total the five basic recommendations of the Senate Select Committee on National Water Resources. This, of course, included the third recommendation, which is most pertinent to S. 2.

"Third, a greatly expanded and comprehensive Federal program of scientific research on water, probing ways both to increase our supplies and to increase the efficiency of our use of available supplies."

The 2,930 soil and water conservation districts of the country—in all 50 States, Puerto Rico, and the Virgin Islands—represent the first custodians of the Nation's annual replenishment of water. These districts with their co-operators—now numbering in excess of 1,800,000 farmers, ranchers, and other landowners and operators—are in a position to make a major contribution to the conservation, development, and improved management of water supplies. Indeed, they are now doing so. In the years ahead they will do even more, for water is a critical element in their operations. All of them are water users. At one time or another each year, most districts face too much or too little water. They engage in drainage, irrigation, water storage, flood prevention, and other forms of water management and control.

Across the landscape of America, districts are uniting in common cause the largest body of conservation-minded citizens owning and operating land—the first catchment for most of the annual replenishment of our water supply.

We in the NACD are impressed by the merits of S. 2. It constitutes an important improvement, in its language and provisions, over S. 3579 (of the 87th Congress), which was widely circulated for the purpose of review and comment.

It is plain in S. 2, for example, that the work to be undertaken would be a part of a comprehensive, expanded program of water research. It is intended to supplement existing and future water research efforts—including those by appropriate Federal agencies and private institutions—and is not intended to serve as a complete program.

The dimensions of water research needs in the United States are so large and diverse, it would have been a serious mistake to centralize administration, or to limit the opportunities for Federal participation in water research, through narrowly drafted or interpreted legislative provisions.

We believe S. 2 has beneficially clarified questions raised last year about the relationships of the various Federal agencies and programs involved in water research. Nothing could be plainer than section 301, which declares that "Nothing in the foregoing section nor in this act is intended nor shall be construed as giving its Secretary or the Department of the Interior any authority or surveillance over water resources research conducted by any other agency of the Federal Government, nor shall it be construed as repealing, superseding, or diminishing existing authorities or responsibilities of any agency of the Federal Government to plan and conduct, contract for, or assist in research in its areas of responsibility and concern with water resources."

We are pleased to note the provisions in S. 2 which call for an annual review of the various water resource research and investigations projects underway—and the protections against low priority or duplicating research.

One might readily argue for the authorization of larger or smaller sums of money in support of the research work contemplated by this bill. Our position, however, is that the initiation of the cooperative research program—with the presently indicated breadth of institutions, foundations, firms, and individuals—is much more important than the precise number of dollars allocated for the work.

As Senator Anderson has pointed out, a program of this character and size cannot be launched immediately. After the authorization, there must be appropriations. Even after these steps, further time must elapse before the intent can be translated into the fact of research underway.

We could comment on many other provisions of S. 2. Our purpose is probably best served in this instance, however, by observing that the soil and water conservation districts of America need and will be able to do a better job in connection with the water supplies coming under their management if they have the benefit of added research. As district supervisors, as district cooperators, and as citizens, we in the NACD believe the prospective water requirements of the United States demand the kind of water research efforts proposed in S. 2—in addition to existing and other efforts which may also be undertaken in this field.

The danger in the water resources situation is not that we will do too much, but that our attention to it will be too small and come too late.

FARGO, N. DAK., *March 11, 1963.*

Hon. MILTON R. YOUNG,
U.S. Senator,
State of North Dakota,
Senate Office Building,
Washington, D.C.

DEAR SENATOR YOUNG: Senate bill 2 relating to the proposed establishment of water resources research centers has been considered by the Fargo City Commission at its last regular meeting. I am pleased to inform you that the bill was endorsed unanimously pursuant to the enclosed certified copy of a resolution adopted by the board of city commissioners.

This appears to be good legislation and definitely in the public interest. We also are hopeful that Fargo, N. Dak., and North Dakota State University will be considered as a site for a water resources research center.

Your efforts in connection with this matter will be appreciated and we would also appreciate being advised as to the progress of this legislation. If there is anything further that we can do, please let us know.

Respectfully yours,

HERSCHEL LASHKOWITZ, *Mayor.*

Enclosures.

CITY OF FARGO, N. DAK.

BOARD OF CITY COMMISSIONERS

* * * * *

BOARD ENDORSES LEGISLATION FOR ESTABLISHMENT OF WATER RESOURCES RESEARCH CENTERS

* * * * *

Commissioner Oakey moved that the board go on record endorsing U.S. Senate bill S. 2 and that the president of the board be requested to forward a copy of this motion to the congressional delegation from the State of North Dakota, and, if such legislation is enacted, that the board take such steps as it deems appropriate to set up a water resources research center at North Dakota State University in the city of Fargo.

Second by Hagen. On call of the roll Commissioners Hagen, Markey, McCanuel, Oakey, and Lashkowitz all voted "aye."

No commissioner being absent and none voting "nay," the motion was declared carried.

* * * * *

CERTIFICATE OF CITY AUDITOR

STATE OF NORTH DAKOTA,
County of Cass, ss:

I, Wm. G. Johnson, do hereby certify that I am the duly appointed, qualified and acting city auditor of the city of Fargo, N. Dak.; and

That the foregoing is a full, true, and correct copy of a motion adopted by the board of city commissioners of the city of Fargo at the regular meeting of the board held on Tuesday, March 5, 1963; and

That such motion is now part of the permanent records of the city of Fargo, N. Dak., as such records are filed in the office of the city auditor.

[SEAL]

WM. G. JOHNSON,
City Auditor of the City of Fargo, Fargo, N. Dak.

APPENDIX

EXHIBIT 1

LIST OF
CURRENT RESEARCH

in

W A T E R R E S O U R C E S

at

THE UNIVERSITY OF ARIZONA

Tucson

January 1963

CURRENT RESEARCH IN WATER RESOURCES

The University of Arizona has long been engaged in research and instruction in water resource development and management and has achieved a recognized position among institutions of higher learning in these fields. Yet, there is the general opinion of the campus community that much more needs to be done and in this spirit the University is now increasing its endeavors in all areas concerned with water resources. The study of the distribution and movement of water on the earth accounts for a disproportionately small percentage of the total scientific research being done in the United States. The burden placed upon our water resources, by the current population explosion, the ever-increasing per capita consumption of water and the insidious destruction of our surface and ground waters by pollution, result in complex problems against which present day knowledge is inadequate.

The development and management of water resources involve the sciences, and their applications that relate the physical environment, biological processes, engineering systems, agricultural and industrial uses, and economic, political and social conditions to the development and management of water resources for maximum welfare. Under this broad framework, research at the University of Arizona is being carried on by the departments of Agricultural Chemistry and Soils, Agricultural Economics, Agricultural Engineering, Agronomy, Civil Engineering, Geology, Horticulture, Watershed Management, the Geochronology Laboratories, the Institute of Atmospheric Physics, the Institute of Water Utilization, and the Laboratory of Tree-Ring Research. The departments of the University are staffed with faculty members whose specialized interests cover the diverse facets of water resources. Laboratory facilities are rapidly being expanded to meet the increasing need for the water resource research programs.

The current research in water resources at The University of Arizona clearly reflects the national trend of expansion of effort upon the many facets of water supply and its relation to life. Indeed, the world-wide recognition of the importance of water to every nation's economy is bringing into focus an awareness that the training of future hydrologists must be broadened to cope with the future complex problems in water. The varied interests of the cooperating departments at The University of Arizona in teaching and research in hydrology are indicated in the diversity of activities shown in the following projects.

DEPARTMENT OF AGRICULTURAL CHEMISTRY AND SOILS

TITLE AND NUMBER OF PROJECT:

Arizona - Water and Ion Movement in Soil and Plants. 472.

SUPPORT:

Agricultural Experiment Station, in cooperation with Southwest Branch, SWC, ARS, USDA.

PERSONNEL:

C. O. Stanberry, L. R. Cooper, W. H. Fuller, H. A. Schreiber.

NATURE OF RESEARCH:

Combination laboratory and field investigation

DESCRIPTION OF PROJECT:

Soil water movement and the movement of ions and dissolved substances in soils and plants are interrelated and comprise the area of investigation. Attention has been given recently to unsaturated flow of water in connection with the movement of various phosphate ions in soils.

PRESENT STATUS:

Active

RESULTS:

The movement of phosphorus from four phosphate sources in sandy, silty, and clay soils was determined by means of radioactive-tagged sources of phosphorus. After application of the phosphorus source, plots were irrigated one to four times. The water soluble phosphates moved only about 1/2 inch deeper after irrigation than the insoluble phosphates.

PUBLICATIONS:

"Vertical Movement of P in Calcareous Soils," C. O. Stanberry, H. A. Schreiber, W. H. Fuller, L. R. Cooper, was presented before the Soil Chemistry Section of the Soil Sci. Soc. Amer. at Ithaca, N. Y. Aug. 20-23, 1962 by senior author. It is in press at the Proc. of the Soil Sci. Soc. Amer.

DEPARTMENT OF AGRICULTURAL CHEMISTRY AND SOILS

TITLE AND NUMBER OF PROJECT:

A Study of the Mechanics of Unsaturated Flow of Water in Soils. Hatch 488.
(W-68)

SUPPORT:

Agricultural Experiment Station.

PERSONNEL:

D. M. Anderson, R. C. Jones, G. Pender.

NATURE OF RESEARCH:

Laboratory investigation

DESCRIPTION OF PROJECT:

An effort is being made to discover all the physical processes occurring during soil water movement.

PRESENT STATUS:

Active

RESULTS:

The movement of a liquid water flow through soils has been shown to consist of no less than five distinct processes: viscous flow of the liquid phase, evaporation of water at the liquid flow, combined diffusion and viscous flow of water vapor ahead of the advancing liquid, sorption of water vapor by the medium, and cyclic heat flow due to thermal gradients and evaporation. A method of distinguishing liquid from vapor movement of water in soils was developed.

PUBLICATIONS:

"Temperature Fluctuations At a Wetting Front": I. Characteristic Temperature-Time Curves. Duwayne M. Anderson and A. Linville. Soil Sci. Soc. Amer. Proc. 26:14-18 (1962).

"Temperature Fluctuations At a Wetting Front": II. The Effect of Initial Water Content of the Medium on the Magnitude of the Temperature Fluctuations. Duwayne M. Anderson, Garrison Sposito, and A. Linville. Soil Sci. Soc. Amer. Proc. (in press).

"Temperature Fluctuations At a Wetting Front": III. Apparent Activation Energies for Water Movement in the Liquid and Vapor Phases. Duwayne M. Anderson, A. Linville, and Garriakon Sposito. Soil Sci. Soc. Amer. Proc. (in press).

DEPARTMENT OF AGRICULTURAL CHEMISTRY AND SOILS

TITLE AND NUMBER OF PROJECT:

Interrelationships of Soil Moisture and Temperature on Plant Growth and Physiological Fractions. Hatch 489. (W-67).

SUPPORT:

Agricultural Experiment Station.

PERSONNEL:

R. H. Maier, X. Kawchack, Ray A. Cattani

NATURE OF RESEARCH:

Laboratory investigation.

DESCRIPTION OF PROJECT:

The physiological aspects of plant growth are known to depend upon soil moisture and temperature. The interrelationship of these two factors has been relatively unstudied because of experimental difficulties. The influence of soil moisture on the chemical forms of iron translocated within plants was selected as a good avenue in approaching the difficult objective suggested by the title of this project.

PRESENT STATUS:

Active

DEPARTMENT OF AGRICULTURAL CHEMISTRY AND SOILS

TITLE AND NUMBER OF PROJECT:

Soil, Water, and Plant Testing as a Means of Improving Crop Production.
State 455.

SUPPORT:

Agricultural Experiment Station

PERSONNEL:

H. V. Smith, W. H. Fuller, G. E. Draper.

NATURE OF RESEARCH:

Laboratory "service" project - chiefly analytical work in the laboratory.

DESCRIPTION OF PROJECT:

This is a service project that assists individuals, departments, and agencies with soil, water, and plant analysis problems. Among the services given are analyses for suitability of water for use as irrigation water; analyses of soils for the major plant nutrients, presence of salts, and for purposes of classification; analyses of plant petioles used chiefly to determine the fertility level of soils.

Constituents commonly found in waters are determined and are used as a basis of determining the quality of water for domestic use or use as irrigation waters.

PRESENT STATUS:

Active (continuing).

RESULTS:

Waters of similar quality are frequently found to be associated with each other in separate parts of the state; thus the areas of "hard waters," "boron waters," "fluoride waters," etc., are becoming better defined.

PUBLICATIONS:

"The Chemical Composition of Representative Arizona Waters." H. V. Smith, A. B. Caster, W. H. Fuller, E. C. Breazeale, and G. E. Draper. Ag. Ext. Sta. Bul. 225. 1949.

"Reclamation of Saline and Alkali Soils," Wallace H. Fuller. Plant Food Review, Fall 1962.

"Gypsum and Other Sulfur Bearing Amendments for Arid and Semi-Arid Soils." W. H. Fuller, and H. Ray. Ag. Ext. A-1 Bul. (in press).

"The Quality of Arizona's Domestic Waters." H. V. Smith, T. F. Buehrer, W. H. Fuller, G. E. Draper. Ag. Ext. Sta. Bul. (in press).

DEPARTMENT OF AGRICULTURAL ECONOMICS

TITLE AND NUMBER OF PROJECT:

Water in relation to social and economic growth in an arid environment.
2RC-220-489.

SUPPORT:

Rockefeller Foundation grant, and Agricultural Experiment Station.

PERSONNEL:

M. M. Kelso, W. E. Martin.

NATURE OF RESEARCH:

The research is analytical; its empirical data will be obtained from secondary sources. It will advance theory and understanding of the relations between natural resources and the human community. It will provide data for several Master's and Doctor's theses.

DESCRIPTION OF PROJECT:

Questions which the research will seek to answer are:

1. What has been and what will be the relation between a limited, falling water supply and the levels of incomes and capital absorption generated (a) in agriculture and (b) in the handling, processing, and supplying industries tributary to it?
2. What will be the income generating and capital absorbing power of Arizona's water in industry sectors other than agriculture and its tributary industries?
3. What rationing of the limited and decreasing supply of water in Arizona among potential uses will produce the greatest long-run economic product?
4. What will be the value of additional water imported from outside or generated inside the area and in what uses will its economic value be greatest?
5. What population characteristics (number, age, health, source and level of income, welfare status, school demands, etc.) accompany the economic changes that have occurred and that may be expected to occur as the water stock diminishes and the society grows?
6. What modifications in present institutional parameters (primarily government, property) will permit attainment of a higher maximum of economic product from the limiting water supply?

PRESENT STATUS:

Active

DEPARTMENT OF AGRICULTURAL ECONOMICS

TITLE AND PROJECT NUMBER:

The Value of Water from Forested Watersheds in Central Arizona. 2RC-220-394.

SUPPORT:

Southwest Forest and Range Experiment Station, U. S. Forest Service, and Agricultural Experiment Station.

PERSONNEL:

M. M. Kelso, Lawrence Mack, David Worley, U.S. Forest Service.

NATURE OF RESEARCH:

Analytical and field investigation for advancement of theory; for the operation and development of watershed management for increased value of its products; and for a Master's thesis.

DESCRIPTION OF THE PROJECT:

The goal of this research is to determine the value of additional surface flow water produced on the Beaver Creek watershed by treatments imposed by the Forest Service when such increased water is used for agricultural production in Maricopa County and when it is used in such manner as to prolong the useful ground-water reserve and reduce costs of pumping.

PRESENT STATUS:

Active

PUBLICATIONS:

"The Stock Resource Value of Water," by M. M. Kelso, Journal of Farm Economics, XLIII(5): 1112-1129, Dec. 1961. (Copies available from the author on request.)

DEPARTMENT OF AGRICULTURAL ECONOMICS

TITLE AND NUMBER OF PROJECT:

Determining and Sharing Costs and Benefits from Development of the Central Arizona Watershed. State 495.

SUPPORT:

Agricultural Experiment Station in cooperation with Rocky Mountain Forest and Range Experiment Station, U. S. Forest Service, and Arizona Water Resources Committee.

PERSONNEL:

M. M. Kelso.

NATURE OF RESEARCH:

Analytical and field investigation for advancement of theory; for the operation and development of watershed management to increase the value of its products.

DESCRIPTION OF THE RESEARCH:

The ultimate objective of this project is to develop recommendations and procedures that can be used by the Arizona Watershed Committee to determine economic-feasibility of any program of watershed management it may propose and to suggest a feasible plan for financial sharing of costs and benefits among affected parties.

To attain this ultimate objective, the following interim objectives will be pursued:

1. To recommend procedures for evaluating and economic-feasibility of alternative plans of watershed management as the basis for selecting the "most favorable" alternative.
2. To recommend procedures for determining the incidence of benefits and costs of any selected program as among affected groups and individuals insofar as such benefits and costs are identifiable and assignable.
3. To recommend possible schemes of organization and procedure whereby the watershed management program may be administered, the costs and benefits prorated, the charges assessed and collected, and the reimbursements determined and paid out.

PRESENT STATUS:

Active

PUBLICATIONS:

"The Stock Resource Value of Water" by M. M. Kelso, Journal of Farm Economics XLIII (5): 1112-1129, December 1961. (Copies available from the author).

DEPARTMENT OF AGRICULTURAL ENGINEERING

TITLE AND NUMBER OF PROJECT:

Effect of Crop Cover on Efficiency of Sprinkler Irrigation Under Varying Climatic and Operating Conditions. Hatch 547. (W-65).

SUPPORT:

Agricultural Experiment Station

PERSONNEL:

K. R. Frost.

NATURE OF RESEARCH:

Laboratory research for theory and design.

DESCRIPTION OF PROJECT:

Precise water balance of growing crops under sprinkler application of irrigation water. Crops are grown in a tank of soil 12 feet in diameter and 2 feet deep. Instrumentation permits measurement of loss or gain of 0.005 inches of water on the area of the tank. Measurements permit evaluation of loss or gain of water from dew, rain, irrigation, evaporation, and transpiration on crops at any stage of growth and as functions of ambient atmospheric conditions.

PRESENT STATUS:

Active

RESULTS:

Evapotranspiration during sprinkling is approximately equal to that during non-sprinkling periods since evaporation from wet foliage replaces normal transpiration. Daily evapotranspiration ranges from 6-8 times the one-hour evapotranspiration at the period of peak rates. Cloud cover reduces evapotranspiration by one-third from that at full-run under the same vapor pressure deficit.

PUBLICATIONS:

"A Weighing Evapotranspirometer." K. R. Frost. Agricultural Engineering. 43(3):160, March 1962.

"Factors Affecting Evapotranspiration Losses During Sprinkling." K. R. Frost. A.S.A.E. Paper No. 62701 (Mimeo) Presented at 1962 Winter Meeting A.S.A.E.

DEPARTMENT OF AGRICULTURAL ENGINEERING

TITLE AND NUMBER OF PROJECT:

Sprinkler Irrigation Studies Under Arid Southwestern Conditions. Hatch 303.

SUPPORT:

Agricultural Experiment Station

PERSONNEL:

K. R. Frost

NATURE OF RESEARCH:

Field investigation for design data.

DESCRIPTION OF PROJECT:

Investigation of the use of sprinkler application of irrigation water in production of Arizona crops. Irrigation efficiencies under sprinkling as compared to efficiencies under surface applications. Irrigation scheduling and system design for sprinkler application of water. Crop yields per unit of land and per unit of water as functions of method of water application, soil type, irrigation schedules, and crop species and variety.

PRESENT STATUS:

Active

RESULTS:

Field tests on citrus, cotton, grains, and legumes indicate increased crop production per unit of water applied when water is applied by sprinklers rather than by surface methods. Results vary with crop and soil texture. On coarse textured soils water savings of 50% have been achieved by sprinkling.

PUBLICATIONS:

"Sprinkler Evaporation Losses", H. C. Schwalen and K. R. Frost, Progressive Agriculture in Arizona. 4(4): 10-11. 1953.

"Sprinkler Irrigation", H. C. Schwalen, K. R. Frost, W. W. Hinz. Ariz. Agr. Exp. Sta. Bull. #250. 1954.

"Sprinkler Evaporation Losses", K. R. Frost and H. C. Schwalen, Agricultural Engineering 36(8) 526-527. Aug. 1955.

"Sprinkler Irrigation of Citrus", K. R. Frost. Progressive Agriculture in Arizona. 6(3): 4. 1955.

"Evapo-transpiration During Sprinkler Irrigation". K. R. Frost and H. C. Schwalen. Trans. of A.S.A.E. 3(1): 18-20, 24. 1960.

"Citrus Irrigation Experiments on the Yuma Mesa", K. R. Frost and R. Rodney. Progressive Agriculture in Arizona. 14(4): 14-15. 1962.

"Twelve Years of Sprinkler Irrigation Research", K. R. Frost. Progressive Agriculture in Arizona 15(1): (in press) 1963.

DEPARTMENT OF AGRICULTURAL ENGINEERING

TITLE AND NUMBER OF PROJECT:

Ground Water Supplies. 436.

SUPPORT:

Agricultural Experiment Station, City of Tucson, and Pima County.

PERSONNEL:

H. C. Schwalen, R. J. Shaw, W. G. Matlock.

NATURE OF RESEARCH:

Field, laboratory and analytical for development.

DESCRIPTION OF PROJECT:

Detailed continuing groundwater inventory of selected basins in Arizona including at present the Santa Cruz from Nogales to Red Rock, Avra, Altar, Little Chino, Redington Area of the San Pedro. Groundwater contour maps are prepared annually. Specific yields, storage coefficients and transmissibilities are determined from well tests. An electric analog of the Tucson groundwater basin is being developed.

PRESENT STATUS:

Active

RESULTS:

Groundwater elevation data has been developed for all areas studied. Volumetric unwatering estimates have been prepared. Water balance estimates have been prepared for the Tucson Metropolitan, Sahuarita Districts, and Cortaro Districts. Open files are maintained from which current ground water level data is available for any location in the area studied.

PUBLICATIONS:

"Water in the Santa Cruz Valley", H. C. Schwalen and R. J. Shaw. Agr. Exp. Sta. Bull. #288. Oct. 1957.

"Suspended Sediment and Chemical Analyses of the San Pedro River at Charleston, Arizona", H. C. Schwalen. Agr. Exp. Sta. Report #202. June 1961.

"Progress Report on Study of Water in the Santa Cruz Valley, Arizona", H. C. Schwalen and R. J. Shaw. Agr. Exp. Sta. Report #205. November 1961.

"Upper Santa Cruz Valley", H. C. Schwalen. Water Resources Report #11, Annual Report on Ground Water in Arizona. Spring 1961 to Spring 1962. pp. 61-66, Arizona State Land Department 1962.

"Avra-Marana Area", H. C. Schwalen, Ibid. pp. 66-71.

"Chino Valley", H. C. Schwalen, Ibid. pp. 106-109.

DEPARTMENT OF AGRONOMY

TITLE AND NUMBER OF PROJECT:

Water Use Efficiency of Forage Crops. Hatch 552.

SUPPORT:

Agricultural Experiment Station

PERSONNEL:

A. A. Baltensperger.

NATURE OF RESEARCH:

Field study.

DESCRIPTION OF PROJECT:

Several thousand genotypes in a species planted nursery will be screened for water use efficiency. Variation within two species of Cynodon will be measured for ability to use water efficiently. Less than optimum water for maximum forage production will be applied in order to separate genotypes for their ability to produce forage under these limited moisture conditions. Mature plants will be measured for total forage production, recovery after harvest and survival.

PRESENT STATUS:

Active

DEPARTMENT OF AGRONOMY

TITLE AND NUMBER OF PROJECT:

Revegetation of Cleared Floodways. 502.

SUPPORT:

Agricultural Experiment Station, U.S. Bureau of Reclamation, Corps of Engineers.

PERSONNEL:

A. A. Baltensperger, J. M. Tromble, K. C. Hamilton and Neal Wright.

NATURE OF RESEARCH:

Field Phase, and laboratory and field phase. Involves both development and theory. Master's thesis is near completion on laboratory phase.

DESCRIPTION OF PROJECT:

Practical field phase deals with discerning which forage species and strains are best adapted to lower Gila River floodway. Both warm and cool season forage species have been established using different quality water for irrigation. Water table and salt content of water and soil were noted.

Laboratory-field phase is concerned with studying germination salt tolerance within and among species of Panicum and Cynodon. Seed lots accessions from various sources of these two genera were studied for their ability to germinate in different concentrations of NaCl, CaCl₂, MgCl₂ and all possible combinations of these three salts.

PRESENT STATUS:

Active

RESULTS:

Field studies showed bermuda grass, Cynodon dactylon, and blue panic grass, Panicum antidotale, to be the most promising warm season forage grasses. Harding grass, Phalaris tuberosa, tall fescue, Festuca arundinacea, and alfalfa, Medicago sativa, were promising as cool season species. It is felt that these adapted species would offer severe competition for invading phreatophytes.

The laboratory salt tolerance study indicated large differences in germination salt tolerance among seed lots of both species. It should be possible to successfully select within Cynodon and Panicum for increased salt tolerance. However, seed accessions exhibited tolerance to one specific salt and not another which indicated selection should be practical for all salts of interest.

PUBLICATIONS:

"Revegetation of a Cleared Section of a Floodway", Bruce Powers, and K. C. Hamilton. Ariz. Agr. Exp. Sta. Report # 198. 23 pp. 1961.

DEPARTMENT OF ANTHROPOLOGY

TITLE AND NUMBER OF PROJECT:

Comparative Analysis of Pre-Industrial Systems of Water Management in Arid Regions. 2RC-NSF530. (359).

SUPPORT:

National Science Foundation.

PERSONNEL:

Richard B. Woodbury.

NATURE OF RESEARCH:

Field work, analysis and synthesis of published and unpublished data.

DESCRIPTION OF PROJECT:

Since the development of Old and New World cultures in arid areas, both civilizations and simpler societies, has been strongly conditioned by the need for water & by the means for its management; and since hypothesis and conclusions as to the nature of this conditioning have rested on scanty factual bases, pre-industrial systems of several areas are under study: (1) southwestern U.S. and northwestern Mexico, (2) central Mexico, (3) coastal Peru, (4) Iraq; (5) Egypt, and (6) the Negev. The purpose is to provide a sounder basis for inferences as to the levels of technologic and social complexity associated with particular types of water control and of the role of water problems in culture growth.

PRESENT STATUS:

Active

INSTITUTE OF ATMOSPHERIC PHYSICS

TITLE AND NUMBER OF PROJECT:

Vegetation Changes in the Sonoran Desert. G11. 2RC-ONR-950-384.

SUPPORT:

Office of Naval Research, and Department jointly with United States Geological Survey.

PERSONNEL:

James Rodney Hastings, Raymond M. Turner.

NATURE OF RESEARCH:

Field, laboratory and analytical.

DESCRIPTION OF PROJECT:

A general investigation into the reasons for arroyo-cutting and vegetation change in the Sonoran desert, and into the mechanics of change.

PRESENT STATUS:

Active

RESULTS:

Recent evidence, to be published shortly, points to climatic change as a dominant factor in Arizona's changing vegetation. Increasing aridity seems to be indicated.

PUBLICATIONS:

"Vegetation Change and Arroyo Cutting in Southeastern Arizona", James Rodney Hastings. Journal Arizona Academy of Science. 1:60-67.1959.

"Precipitation and Saguaro Growth", James Rodney Hastings. University of Arizona Arid Lands Colloquia. 1959-60, 1960-1961.

"Physical Determination of Growth and Age in the Giant Cactus", James Rodney Hastings and Stanley M. Alcorn. Journal Arizona Academy of Science 2:32-39. 1961.

"The Changing Mile--A Photographic Study of Vegetation Change with Time in the Lower Life Zones of a Semi-Arid Region", James Rodney Hastings and Raymond M. Turner. (In preparation for The University of Arizona Press.)

INSTITUTE OF ATMOSPHERIC PHYSICS

TITLE AND NUMBER OF PROJECT:

Climatology of Arizona, G-11.

SUPPORT:

Departmental project.

PERSONNEL:

William D. Sellers, Christine R. Green.

NATURE OF RESEARCH:

Analytical evaluation of Arizona climatic data.

DESCRIPTION OF PROJECT:

Project is to provide a complete description of the past and present climate of Arizona.

PRESENT STATUS:

Active

PUBLICATIONS:

"Arizona Climate", William D. Sellers, editor, 500 pp., Sept. 1960; revised and published by University Press in 1963.

"Arizona Climate, supplement No. 1", Christine R. Green, 400 pp., Feb. 1962.

A list of available technical reports may be obtained from the Institute of Atmospheric Physics.

INSTITUTE OF ATMOSPHERIC PHYSICS

TITLE AND NUMBER OF PROJECT:

Saline Water Demineralization. 2RC-OSW 950. (340).

SUPPORT:

Office of Saline Water, U. S. Department of the Interior.

PERSONNEL:

Carl N. Hodges, John E. Groh, T. Lewis Thompson.

NATURE OF RESEARCH:

Analytical evaluation, laboratory testing and developmental work.

DESCRIPTION OF PROJECT:

The project is the development and evaluation of a solar powered demineralization system.

PRESENT STATUS:

Active

RESULTS:

A small experimental demineralization plant has been developed and is presently operating. Preliminary results indicate that the process may be economically attractive in sunny areas.

PUBLICATIONS:

Interim Report I. "Separate Component Multiple-Effect Solar Distillation", Carl N. Hodges, T. Lewis Thompson, John E. Groh. Institute of Atmospheric Physics, The University of Arizona. 1962.

INSTITUTE OF ATMOSPHERIC PHYSICS

TITLE AND NUMBER OF PROJECT:

Energy Balance of Desert Regiona. G11

SUPPORT:

Departmental project.

PERSONNEL:

William D. Sellers, Carl N. Hodges

NATURE OF RESEARCH:

Field investigation for testing of new equipment.

DESCRIPTION OF PROJECT:

Project is to accurately measure all components of the energy balance over various types of desert surfaces. Emphasis is placed on measuring the heat used for evaporation.

PRESENT STATUS:

Active

RESULTS:

Evaporation rates measured in the dry stream channel of Walnut Gulch in southeastern Arizona over an 18-day period in October 1961 were high enough to indicate that natural recharge of the water table is negligible when the water table is 48 to 90 cm below the surface. For dry soils evaporation rates appear to decrease with increasing wind speed; the reverse is true for wet soils. Practically all the radiative energy incident on short grass is used for evaporation.

PUBLICATIONS:

"The Energy Balance of Non-Uniform Soil Surfaces", William D. Sellers and Carl N. Hodges, Journal of the Atmospheric Sciences, 19:6:482-491, November 1962. May be obtained from the Institute of Atmospheric Physics.

INSTITUTE OF ATMOSPHERIC PHYSICS

TITLE AND NUMBER OF PROJECT:

Physics of Convective Clouds and Cloud Modification. 2RC-NSF-950(552).

SUPPORT:

National Science Foundation, U. S. Weather Bureau, and U. S. Forest Service.

PERSONNEL:

L. J. Battan and A. R. Kassander, Jr.

NATURE OF RESEARCH:

Field investigations of the physics of convective clouds and the effects of cloud seeding with silver iodide.

DESCRIPTION OF PROJECT:

The program involves detailed observations of convective clouds during the summer by means of radar, a pair of high resolution cameras. A network of recording rain gages is employed to measure rainfall. Cloud seeding is conducted with airborne silver-iodide generators. A carefully-controlled randomization scheme is employed to decide on which days to seed. The results are analyzed statistically. In addition a physical evaluation is made to uncover information about the fundamental nature of cloud and precipitation formation.

PRESENT STATUS:

Active

RESULTS:

To date the experiments have failed to show that cloud seeding with silver iodide can increase rainfall from the convective clouds commonly observed in the summer in the vicinity of Tucson. The analyses suggest that the quantity of rainfall does not depend on the ice nuclei properties of the air. This result leads to the inference that seeding with ice nuclei (such as silver iodide particles) is not likely to be successful in increasing rainfall.

PUBLICATIONS:

"Design of a Program of Randomized Seeding of Orographic Cumuli," L. J. Battan and A. R. Kassander, Jr., J. Meteor., 17, No. 6, 583-590 (1960).

"Some Properties of Convective Clouds," L. J. Battan, Nubila, Verona, Italy, IV, No. 1, 1-12 (1961).

"Evaluation of Effects of Airborne Silver-Iodide Seeding of Convective Clouds," L. J. Battan and A. R. Kassander, Jr., Sci. Rep. No. 18, Inst. of Atmos. Physics, Univ. of Ariz., Tucson, 59 pp. (1962).

"Relationship between Cloud Base and Initial Radar Echo," L. J. Battan, J. Applied Meteor., 2 (1963) (Accepted for publication).

DEPARTMENT OF CHEMICAL ENGINEERING

TITLE AND NUMBER OF PROJECT:

Solar Evaporation of Saline Waters Under Vacuum.

SUPPORT:

Departmental funds for initial phases of research.

PERSONNEL:

D. H. White, and I. Shaheen.

NATURE OF RESEARCH:

For master's degree thesis in Chemical Engineering.

DESCRIPTION OF PROJECT:

Solar evaporation of saline or brackish waters in systems, either mechanical or desert sands as process facilities, with pressures below atmospheric and corresponding operating temperatures of evaporation and condensing in the range of 60 to 120 F.

PRESENT STATUS:

Active

DEPARTMENT OF CIVIL ENGINEERING

TITLE AND NUMBER OF PROJECT:

Hydrologic Characteristics of a Groundwater Basin. (part of AES436).

SUPPORT:

City of Tucson and Pima County through a cooperative agreement with the Agricultural Engineering Department, Arizona Agricultural Experiment Station.

PERSONNEL:

John Ferris, W. G. Matlock.

NATURE OF RESEARCH:

Analytical, laboratory, and field investigations for development, operation, design and theory, for Doctoral dissertation.

DESCRIPTION OF PROJECT:

Attempts are being made to determine the hydrologic characteristics (specific yield and/or storage coefficient and transmissibility) of the groundwater basin in the Santa Cruz Valley near Tucson, Arizona. Well tests are being made at sites where observation wells are available. Water budget analyses are being used in connection with mathematical models. A passive element electric analog model is being developed.

PRESENT STATUS:

Active

RESULTS:

Well tests made during the past two years indicate that realistic values of specific yield and/or storage coefficient are not obtained from such tests in the Santa Cruz Valley. Values of transmissibility are more consistent and reasonable.

DEPARTMENT OF CIVIL ENGINEERING

TITLE AND NUMBER OF PROJECT:

Scour at Relief Bridges.

SUPPORT:

Departmental

PERSONNEL:

Emmett M. Laursen; Robert B. Conklin

NATURE OF RESEARCH:

Laboratory investigation related to theory and design, for Master's thesis.

DESCRIPTION OF PROJECT:

To find the effect of sediment size and velocity of flow on the limiting depths of clear-water scour in simple relief-bridge geometries. First, the case of the long contraction will be studied, then the case of the long gradually-contracting channel. The last case to be studied will involve various simple abrupt contractions. Throughout the experiments, examination of the assumptions of the analysis of Dr. E. M. Laursen will be made and also of the time dependency of depth of scour insofar as feasible.

PRESENT STATUS:

Active

RESULTS:

Based on the assumptions that the depth of scour at the obstruction is a multiple of the depth of scour in a comparable long contraction, that the particle shear upstream can be evaluated by Manning's formula and Strickler's relation, and that the shear in the scoured area is the critical tractive force, analytical relationships for the depth of scour have been obtained.

PUBLICATIONS:

"An Analysis of Relief Bridge Scour," by E. M. Laursen, submitted to Journal of the Hydraulics Division, American Society of Civil Engineers.

DEPARTMENT OF CIVIL ENGINEERING

TITLE AND NUMBER OF PROJECT:

Critical Tractive Force of Uniform Sands.

SUPPORT:

Departmental project

PERSONNEL:

Emmett M. Laursen; Jimmy F. Harp

NATURE OF RESEARCH:

Analytical and laboratory investigation related to theory, for Doctoral dissertation.

DESCRIPTION OF PROJECT:

Analytic and experimental attempts to relate the average boundary shear to the incipient movement of sediment particles composing the boundary. In the laminar regime, the analysis will proceed by approximating the forces on sediment particles in various possible positions among other sediment particles. The turbulent flow regime analysis will also consider the statistical nature of the variations in the flow.

The experimental results will be used to determine any needed constants or functions and to verify the approximate analyses.

PRESENT STATUS:

Active

DEPARTMENT OF CIVIL ENGINEERING

TITLE AND NUMBER OF PROJECT:

Characteristics of Segmental Orifices.

SUPPORT:

Departmental project

PERSONNEL:

Emmett M. Laursen, Norman H. Perry

NATURE OF RESEARCH:

Laboratory investigation for development, for Master's thesis.

DESCRIPTION OF PROJECT:

A partial orifice plate, such as a segment of a circle, may have advantages in some situations as a metering device. The discharge and loss characteristics of such a constriction will be studied.

PRESENT STATUS:

Active

DEPARTMENT OF CIVIL ENGINEERING

TITLE AND NUMBER OF PROJECT:

The Biochemical Oxygen Demand of Algal Suspensions. ERL 6200.

SUPPORT:

Department and National Institutes of Health of the U.S. Department of Health, Education and Welfare

PERSONNEL:

Quentin M. Mees; Stanley J. Dea

NATURE OF RESEARCH:

Laboratory investigation related to theory for Master's thesis.

DESCRIPTION OF PROJECT:

The biochemical oxygen demand test is of major importance in the examination of polluted waters, because it is an important indication of its organic stability. The presence of algae in these waters exerts an oxygen demand when the BOD test is determined, therefore giving a misleading value. The purpose of this thesis is to determine the difference in BOD exerted by suspended algae using a reliable and relatively straightforward laboratory determination.

The chlorophyll test and the volatile filtered solids test will be used in attempting to find a consistent technique for evaluating the oxygen demand exerted by the presence of algae in samples used for routine BOD determinations involving incubation in the dark.

PRESENT STATUS:

Active

DEPARTMENT OF CIVIL ENGINEERING

TITLE AND NUMBER OF PROJECT:

Alkyl Benzene Sulphenate Removal in Raw Sewage Stabilization Lagoons.
ERL 6200.

SUPPORT:

Department in cooperation with the National Institutes of Health of U. S. Department of Health, Education, and Welfare; and Sanitary District No. 1 of Pima County.

PERSONNEL:

Quentin M. Mees; Bill B. Dendy

NATURE OF RESEARCH:

Field and laboratory investigation related to theory and operation for Master's thesis.

DESCRIPTION OF PROJECT:

A study of the effect of raw sewage stabilization lagoons on the concentrations of ABS which are imposed upon them.

PRESENT STATUS:

Completed

RESULTS:

It was established that in all probability no reduction in ABS concentration was affected by the process. For the particular installation under observation, an increase in concentration in the lagoon over that in the raw sewage was observed. Probable reasons given for the observed increase included excessive evaporation rates, during initial phases of operation, which drastically reduced the effluent flow during the period of study. Following substantial increases in effluent flow, recent observations of ABS concentrations seem to substantiate this hypothesis.

PUBLICATIONS:

"Alkyl Benzene Sulphenate Removal in Raw Sewage Stabilization Lagoons," Master's thesis, Bill B. Dendy, The University of Arizona, 1962.

DEPARTMENT OF CIVIL ENGINEERING

TITLE AND NUMBER OF PROJECT:

Natural Sealing Potential of Raw Sewage Stabilization Lagoons. ERL 6200.

SUPPORT:

Department in cooperation with the National Institutes of Health of the U.S. Department of Health, Education, and Welfare; and Sanitary District No. 1 of Pima County.

PERSONNEL:

Quentin M. Mees; Stephen A. Deming.

NATURE OF RESEARCH:

Field and laboratory investigation related to theory and design, for Master's thesis.

DESCRIPTION OF PROJECT:

To determine and correlate the probable losses of water from a raw sewage stabilization lagoon located 14 miles northwest of Tucson, Arizona, in the Santa Cruz River Valley being administered and operated by Sanitary District No. 1 of Pima County. The evaporation from the liquid surface will be determined by an evaporation pan at the site, and the accumulated data correlated with permanent weather installations in the valley. Seepage will be investigated by auger and tube assemblies with such auxiliary structures and facilities needed to accomplish the work. Representative sampling of the lagoon bottom material and material adjacent to the lagoon site will be accomplished. Soil samples will be classified and tested for permeability, moisture content, and all other factors deemed necessary to evaluate the problem. Seepage and evaporation data will be combined with inflow and outflow data in an effort to establish a hydrologic balance.

PRESENT STATUS:

Active

DEPARTMENT OF CIVIL ENGINEERING

TITLE AND NUMBER OF PROJECT:

Oxidation Ponds for the Treatment of Raw Sewage in the Southwest. ERL 6200.

SUPPORT:

Department and National Institutes of Health of the U. S. Department of Health, Education, and Welfare

PERSONNEL:

Quentin M. Mees; Eugene W. Dooley

NATURE OF RESEARCH:

Field and laboratory investigation related to theory and design, for Master's thesis.

DESCRIPTION OF PROJECT:

Oxidation ponds for the treatment of raw sewage are an economical and efficient method of treatment applicable to domestic sewage flows. Their efficiency is probably increased in the arid southwest by virtue of the ample supply of sunshine, and thus design criteria may be different. The design criteria of states with similar climatic conditions will also be examined but must be weighted by consideration of the attitude that these states take toward such installations.

PRESENT STATUS:

Active

DEPARTMENT OF CIVIL ENGINEERING

TITLE AND NUMBER OF PROJECT:

Survival of Pathogens in Sewage Stabilization Ponds. ERL 6200.

SUPPORT:

Department in cooperation with the National Institutes of Health of the U. S. Department of Health, Education, and Welfare, Arizona State Department of Health, and Sanitary District No. 1 of Pima County.

PERSONNEL:

Quentin M. Mees; Jack R. Hensley

NATURE OF RESEARCH:

Field and laboratory investigation for operation, development, theory, and design.

DESCRIPTION OF PROJECT:

A study of the ability of amoeba, intestinal flagellates, and ova of helminths to survive the stabilization processes in a raw sewage stabilization pond. Chemical analyses aimed at evaluating various environmental parameters include acidity, alkalinity, biochemical oxygen demand, chlorides, dissolved oxygen, nitrogen, pH, phosphates, suspended solids, temperature, turbidity, and Coleform concentrations.

PRESENT STATUS:

Active

DEPARTMENT OF CIVIL ENGINEERING

TITLE AND NUMBER OF PROJECT:

Flow Patterns in a Stabilization Lagoon.

SUPPORT:

Department in cooperation with Sanitary District No. 1 of Pima County.

PERSONNEL:

Quentin M. Mees; William C. Pisano

NATURE OF RESEARCH:

Field investigation for design and development for Master's thesis.

DESCRIPTION OF PROJECT:

The flow pattern in a stabilization lagoon is affected by the thermal structure in the lagoon, the surface winds, and the diffusion of the jet inflow so that serious short circuiting can result. The true patterns obtained will be measured and means of controlling these factors will be investigated.

PRESENT STATUS:

Active

DEPARTMENT OF CIVIL ENGINEERING

TITLE AND NUMBER OF PROJECT:

A Study of Partially Saturated Flow in Sand-Epoxy Resin Columns.

SUPPORT:

Departmental project

PERSONNEL:

Richard L. Sloane; John B. Carney

NATURE OF RESEARCH:

Laboratory investigation related to theory, for Doctoral dissertation.

DESCRIPTION OF PROJECT:

The flow of water through soils often takes place under conditions of partially saturated flow. The prediction of fluid distribution and pressure under conditions of partially saturated flow is important to those interested in the problem of recharge to the ground water table from water applied to the surface of the earth.

This study of partially saturated flow will make use of vertical columns made of sand grains cemented together with epoxy resin. The use of this type of sand column will result in a model for which properties such as void ratio and particle arrangement will remain constant during a series of tests.

PRESENT STATUS:

Active

GEOCHRONOLOGY LABORATORIES

TITLE AND NUMBER OF PROJECT:

Radiocarbon as a Tracer in Water Supply Problems

SUPPORT:

Departmental and Research Corporation.

PERSONNEL:

Paul E. Damon, J. W. Harshbarger, J. Sigalove, A. Long, Fred Cagle.

NATURE OF RESEARCH:

Laboratory and field; basic research; thesis and dissertation work.

DESCRIPTION OF PROJECT:

The study of ground water movement through aquifers has been limited by the slow rate of movement of the subsurface waters. Thus, if a tracer is introduced, only limited information is obtainable between the times of spiking and observation. However, radiocarbon (C-14) has been naturally introduced into ground water reservoirs continuously throughout geologic time and, consequently, movement which has taken place during the last 45,000 years may be studied. In addition, nuclear technology is now producing radiocarbon at a greater rate than nature and so this artificially produced radiocarbon may also be used to trace recent water movements. Furthermore, it represents a potential hazard to health and therefore it is essential to monitor the increment for the safety of the community.

We propose to monitor the present carbon-14 content of surface water and organic matter in the Southwest and to measure the radiocarbon content of subsurface waters. The source of the carbon in water will be determined by C^{12}/C^{13} measurements. This data will be related to ground water hydrologic problems such as the rate of laminar flow through aquifers, their permeability, the source and rate of recharge, paleoclimatology, radioactive contamination in water supplies, and the waste disposal problem.

PRESENT STATUS:

Active

RESULTS:

The C-14 age of a number of water samples has been determined. The results are quite reasonable. For example, flow rates of approximately 10 feet per year have been deduced in the Safford region. The uptake of bomb C-14 in vegetation is also being monitored.

PUBLICATIONS:

"Arizona Radiocarbon Dates IV," P. E. Damon, Austin Long, and J. J. Sigalove, American Journal of Science, Radiocarbon, Vol. 5, 1963, in press.

GEOCHRONOLOGY LABORATORIES

TITLE AND NUMBER OF PROJECT:

Pollen Analysis and Statistical Correlations of Pluvial Lakes. NSF-337.

SUPPORT:

National Science Foundation

PERSONNEL:

Paul S. Martin, James E. Mosimann, P. J. Mehringer, R. Hevly

NATURE OF RESEARCH:

Pollen stratigraphic study of dry lake beds in various playas of western North America; multivariate statistical analysis and IBM computing of the results as a method of detecting significant relationships between fossil pollen types. Both laboratory and field studies are involved. Part of the results may be used in a Ph.D. thesis by Mehringer.

DESCRIPTION OF PROJECT:

We are collecting and counting mud samples from drill cores taken in the Willcox Playa, Arizona; China Lake, California; Greak Salt Lake, Utah, Montezuma Well and Laguna Salada, central Arizona. Pollen counts of the core samples are used to correlate between playa lakes, and to determine the nature of Pleistocene environmental changes. The history of wind-pollinated (and allergy-producing) plants can be followed in detail. The geologic and hydrologic history of the basins is also revealed through the pollen record.

PRESENT STATUS:

Active

RESULTS:

In each core studied to date, the Wisconsin pluvial period is marked by major changes in vegetation - pinon-juniper woodland into the Mojave Desert, pine woodland into the Great Salt Lake Desert, and pine-spruce forest into central Arizona north of the Mogollon Rim. Statistical correlations show that in the Willcox Playa, pine and spruce are positively correlated while the correlations between other types change with time. There is no clear cut evidence of a pre-Wisconsin pluvial episode.

PUBLICATIONS:

"Geochronology of Pluvial Lake Cochise II. Pollen analysis of a 42 m. core," Paul S. Martin. To appear in Ecology, 1963, summer issue.

"Geochronology of Pluvial Lake Cochise I. Pollen analysis of shore deposits," Paul S. Martin with R. H. Hevly, Jour. Ariz. Acad. Sci., 2:24-31, 1961.

DEPARTMENT OF GEOLOGY

TITLE AND NUMBER OF PROJECT:

Geologic Framework and Hydrology of Alluvial Basins in Arizona.

SUPPORT:

Departmental, Rockefeller Foundation

PERSONNEL:

John W. Harshbarger, Jerry Harbour, James Marlowe, Charles L. Fair

NATURE OF RESEARCH:

Field and laboratory studies relating the pertinent geological factors to development of water supplies.

DESCRIPTION OF PROJECT:

To translate complex subsurface geometric parameters into permeability, transmissibility, storage capacity, and specific parameters. Appraise suitable geologic environments for potential areas of artificial recharge. Field studies included detailed stratigraphic mapping and subsurface mapping with the aid of water well logs, gravimetric geophysical data. Safford basin served as principal study area.

PRESENT STATUS:

Active

RESULTS:

The geometric and geological boundaries of Safford basin depart from the classical concept of alluvial basin framework. The establishment of the occurrence of several ground water systems (artesian and non-artesian) provides facts for guidelines to management of water supply. The occurrence of previously unknown gravel aquifers was established.

PUBLICATIONS:

"Geohydrology of the Safford Inner Valley," Charles L. Fair, Arizona Geological Society Digest, 4th annual vol., 1962.

"Geologic Framework and Hydrology of Intermountain Valleys of the Great Basin (abstract)," John W. Harshbarger, Geol. Soc. America Bull., v. 71, 1961.

"Geohydrology of Arid Lands - Arizona - a case study." John W. Harshbarger. Proceedings of Arid Lands Colloquium, Univ. of Ariz. Press, 1961

DEPARTMENT OF GEOLOGY

TITLE AND NUMBER OF PROJECT:

Capturing Additional Water for Increasing Supplies.

SUPPORT:

Interdepartmental in cooperation with U. S. Geological Survey

PERSONNEL:

John W. Harshbarger, Robert Streitz, Geo. Maddox, John F. Lance

NATURE OF RESEARCH:

Field and laboratory studies for development design.

DESCRIPTION OF PROJECT:

Subsurface lithologic mapping of the Tucson basin sediments from drill cutting samples and well logs to determine geologic skeleton of the ground water reservoir. Preliminary flow-net determinations to ascertain the transmissibility and storage coefficient parameters. Ascertainment of geologic environment for potential artificial recharge of surface water.

PRESENT STATUS:

Active

RESULTS:

The complex lithologic character of the basin sediments are not amenable to simple quantitative determination techniques. Digital number system devised for describing lithology. The spatial distribution of relative permeable and impermeable currents, subsurface faults and the reflections on the water table.

The known geometric configuration of the permeable zones indicate specific areas where artificial recharge could be achieved and wells could be developed for maximum water yield.

PUBLICATIONS:

Master's Thesis, George Maddox, The University of Arizona, 1961.

Master's Thesis, Robert Streitz, The University of Arizona, 1962.

"Capturing Water for Increasing Supplies in Land and Water Use." J. W. Harshbarger, A.A.A.S. special volume (in press).

DEPARTMENT OF GEOLOGY

TITLE AND NUMBER OF PROJECT:

Mining Geohydrology.

SUPPORT:

Departmental project.

PERSONNEL:

Estes F. Hollyday, John G. Ferris

NATURE OF RESEARCH:

Field and analytical; theory and development; Master's thesis

DESCRIPTION OF PROJECT:

A geohydrologic analysis of mine dewatering and water development with special reference to Tombstone mining district, Cochise County, Arizona. The project investigates the interrelationships between geology and hydrology, in fractured crystalline rocks, through field investigation, analysis of nine years of pumping records, and geologic reports. The ultimate purpose is to develop new concepts of hydrologic behavior of fractured crystalline rocks with special reference to mining areas.

PRESENT STATUS:

Active

RESULTS:

The reported vast quantities of water pumped from the Tombstone mines during the period 1903 to 1911 have been supplied to the hornfels-marble aquifer complex of the mines from storage in the valley alluvium north of the mining district. Storage in the mine rocks is less than 1% by volume. Transmissibility is found to decrease logarithmically with time and higher rates of pumping, apparently varying between 20,000 and 5,000 gallons per day per foot of aquifer. Within the mines, movement is entirely through fractures, fissures and solution openings.

DEPARTMENT OF GEOLOGY

TITLE AND NUMBER OF PROJECT:

Ground Subsidence Due to Groundwater Withdrawal in the Tucson Basin and Tempe, Arizona.

SUPPORT:

Departmental project.

PERSONNEL:

W. C. Lacy, W. S. Platt, Neal Nollau.

NATURE OF RESEARCH:

Laboratory and field investigation; Master's thesis

DESCRIPTION OF PROJECT:

Observation of structural damage to buildings in Tucson as a guide to zones of differential ground movement. Correlation of the pattern of building fracturing intensity with soil types, depression of ground water level, and subsidence of bench marks in the Tucson Basin area and Tempe, Arizona.

PRESENT STATUS:

Active

RESULTS:

Close correlation with water withdrawal and ground subsidence effects exist.

DEPARTMENT OF GEOLOGY

TITLE AND NUMBER OF PROJECT:

The Relationships of the Confined and Unconfined Water Tables Above and Below the Tres Alamos Dam Site of the San Pedro River, Cochise County, Arizona.

SUPPORT:

Departmental project.

PERSONNEL:

E. L. Montgomery, John W. Harshbarger.

NATURE OF RESEARCH:

Field investigation for development; Master's thesis.

DESCRIPTION OF PROJECT:

Geologic mapping at a scale of 3 inches to the mile of Townships 14 and 15 south, Range 20 east. Gravity survey information derived from converting gravity values to varying thicknesses of valley fill will be used in conjunction with well logs to determine thickness and water characteristics of the underlying strata. The preceding information and data from water levels in well records will be used to determine the relationships of the confined and unconfined water tables above and below the Tres Alamos Dam site of the San Pedro River.

PRESENT STATUS:

Active

RESULTS:

The confined water above and below the Tres Alamos Dam site seems to be hydraulically connected through a ground water pass, west of the granitic outcrop forming the Dam site. The unconfined water tables seem to be connected or continuous through the present stream channel of the San Pedro River.

DEPARTMENT OF GEOLOGY

TITLE AND NUMBER OF PROJECT:

The Occurrence of Thermal Ground Water in the Basin and Range Province of Arizona.

SUPPORT:

Water Resources Division of the U. W. Geological Survey

PERSONNEL:

Jerome J. Wright.

NATURE OF RESEARCH:

Analytical and field investigation; operation and development; research with possibility of doctoral dissertation.

DESCRIPTION OF PROJECT:

The principal object of the report was to examine on a regional basis the occurrence of ground-water having temperature considered to be higher than normal. The occurrence of thermal water is closely allied to the structural elements of the Basin and Range Province. Geothermal gradients computed for a number of occurrences display a wide range of values. Chemical analyses of hot spring water taken from a representative group of springs in the province indicate diverse origins and environments.

PRESENT STATUS:

Completed.

RESULTS:

Results indicate that a great amount of data concerning ground water may be obtained by detailed thermal studies using electronic instruments. Work of this nature has not been done to date. A considerable amount of experimentation on methodology must be performed.

PUBLICATIONS:

Report, Jerome J. Wright, in press in the U.S. Geological Survey Circular, U.S. Geological Survey, Washington, D.C.

HYDROLOGY PROGRAM

TITLE AND NUMBER OF PROJECT:

Current Meter Development.

SUPPORT:

Departmental and the Ground Water Branch of the U.S. Geological Survey.

PERSONNEL:

E. H. Cordes, John G. Ferris

NATURE OF RESEARCH:

Design and Development for Field Use, Master's Thesis.

DESCRIPTION OF PROJECT:

This project will entail the design and operation of a current meter to measure the vertical velocity component in a pumping well. The velocity profile can then be applied to study transmissibility of ground water aquifers.

PRESENT STATUS:

Active well.

HYDROLOGY PROGRAM

TITLE AND NUMBER OF PROJECT:

Development of Hydraulic Models Analogous to Subsurface Geologic Conditions for Studying and Demonstrating the Characteristics of Ground Water Movement. NSF-G17703.

SUPPORT:

National Science Foundation.

PERSONNEL:

Jay H. Lehr, Jerome J. Wright.

NATURE OF RESEARCH:

Laboratory Investigation, Design, development and operation.

DESCRIPTION OF PROJECT:

The purpose of the project is to clarify the characteristics of laminar flow in groundwater movement in a manner which will enable a visual flow net analysis. Hydraulic models are being developed which consist of consolidated media simulating sedimentary rock, enclosed in a water-tight case with a transparent side. Basic geologic structures and lithologies can be synthesized, and colored inks can be inserted into the flow system of the model, forming visible flow lines. These flow lines can then be observed and analyzed in order to better understand the pattern of laminar groundwater flow as controlled by geologic factors. A few of the empirical model experiments which are being carried out include: 1) Refraction of flow bands across lithologic interfaces, 2) Continuity of flow around and through highly permeable and impermeable lenses of different lithologies, 3) Flow net systems caused by a single pumping well, 4) Flow-net system of mutual interference of depression cones caused by pumping multiple wells, 5) Artesian aquifer systems, 6) Infiltration phenomenon.

Models are being developed for use in education in science and hydrology at the college and university level.

PRESENT STATUS:

Active.

RESULTS:

Models consisting of plexiglass cases containing artificially consolidated porous media which can be arranged in a nearly infinite variety of geologic structures and hydrologic situations have been developed. A wide variety of these models have been constructed and through their use it has become possible for the college student to obtain a clear description and understanding of previously conceived groundwater theories.

PUBLICATIONS:

"Empirical Studies of Laminar Flow in Porous Consolidated Media" (Abstract), Jay H. Lehr, Geological Society of America Bulletin, Special Paper 68, p. 217, 1961.

"Empirical Studies of Laminar Flow in Porous Consolidated Media," Jay H. Lehr, Doctoral Dissertation in Hydrology; The University of Arizona, June 1962.

HYDROLOGY PROGRAM

NUMBER AND TITLE OF PROJECT:

The Mechanics of Earth Fissuring in Alluvial Basins.

SUPPORT:

Department of Geology in cooperation with the U.S. Geological Survey.

PERSONNEL:

Dennis E. Peterson, H. E. Skibitzke

NATURE OF RESEARCH:

Analytical and Field Investigation for Theory and Doctoral Dissertation.

DESCRIPTION OF PROJECT:

Field studies:

- Mapping fissure locations
- Mapping surface elevation changes
- Mapping changes in water levels
- Gravity surveys for analysis of basin structures

Synthssis of field data into a working hypothesis for the origin of the fissures.

Formulation of a model describing the development of fissures by means of theoretical mechanics.

PRESENT STATUS:

Active.

RESULTS:

Fissure locations are associated with differential subsidence.

PUBLICATIONS:

"Notes on Earth Fissures in Southern Arizona," G. M. Robinson and D.E. Peterson, U.S. Geological Survey Circular 466, 1962, U. S. G. P. O., Washington 25, D. C.

"Earth Fissuring in Pinal County, Arizona," D. E. Peterson, M.S. Thesis, 1962; The University of Arizona, Tucson.

HYDROLOGY PROGRAM

TITLE AND NUMBER OF PROJECT:

Groundwater Hydrology of the Western Desert, U.A.R.

SUPPORT:

Department of Geology in cooperation with the General Desert Development Authority, Cairo, U.A.R.

PERSONNEL:

Moh. H. I. Salem, John W. Harshbarger, J. G. Ferris.

NATURE OF RESEARCH:

Analytical study of field data; operation and development; Doctoral dissertation.

DESCRIPTION OF PROJECT:

An electric analog model of the subsurface geologic and hydrologic conditions of the western desert of the U.A.R., Libya, Sudan and Tchad is being constructed. Presently the area of recharge is in the high regions of Tchad and of Darfur in the Sudan. Groundwater is discharged into the Nile and into the Qattara Depression. The distribution of the fundamental differential equations in the system will be determined taking into consideration the boundary conditions. It is hoped that the equations can be solved with the use of the electric analog model. The effects on the Ground Water system due to changed boundary conditions such as the completion of the Aswan High Dam (The Nile is expected to recharge water to the aquifer after the dam is completed) or the initiation of the Qattara Depression project, will be included in the general analysis of the western desert.

PRESENT STATUS:

Active

DEPARTMENT OF HORTICULTURE

TITLE AND NUMBER OF PROJECT:

Response of Citrus Trees to Soil Moisture; Movement of Soil Moisture in the Root Zone. Hatch 371.

SUPPORT:

Agricultural Experiment Station.

PERSONNEL:

R. H. Hilgeman, J. A. Dunlap.

NATURE OF RESEARCH:

Combination field and laboratory research for operation and theory.

DESCRIPTION OF PROJECT:

The conservation of water is of vital importance in Arizona because of the overdevelopment of the underground supply and recurring droughts. Present experiments now in progress at the Citrus Experiment Station show that the application of different amounts of water had marked effects upon tree growth and fruiting. Preliminary experiments on the movement of water in the upper six feet of bare soil suggest that relatively large quantities of water are lost through evaporation and downward percolation from the root zone of the plants. These experiments will be coordinated under this project. Further information is required to determine methods of maintaining water in the root zone while reducing evaporational and percolation losses. Such data has wide application throughout all desert areas similar to Arizona. Valencia orange trees have been found to closely respond in vegetative growth, fruit quality and size to the amount of water currently applied. Fruiting responses have been slow and do not become evident for several years. Information acquired from this work will contribute to a program of developing methods of water application which will supply the needs of the tree with a minimum loss from evaporation and percolation.

PRESENT STATUS:

Active.

RESULTS:

Present field tests show clearly that keeping the soil in the root zone constantly above the wilting point induces poor tree condition after several years. A program of alternate periods of high soil moisture followed by periods of low soil moisture with moderate stress on the trees has prevented this condition and increased yields. Exploratory data indicates that the amount of water depletion from the soil does not fit the root distribution pattern. Water loss from noncropped cultivated plots, covered plots and crop plots, shows that as much as 55% of the water applied may be lost by downward drainage and evaporation conditions. This program coordinates within one experiment, all present research on water responses of citrus trees and studies of movement of soil moisture.

PUBLICATIONS:

"The Effect of Temperature, Precipitation, Blossom Date and Yield upon the Enlargement of Valencia Oranges," R. H. Hilgeman, H. Tucker, and T. A. Hales; Proceedings of the American Society for Horticulture Science, Volume 74, 1959, pages 266 - 279.

"Commercial Citrus Production in Arizona," R. H. Hilgeman and D. R. Rodney; Special Report No. 7, Agricultural Experiment Station and Cooperative Extension Service, The University of Arizona.

LABORATORY OF TREE-RING RESEARCH

TITLE AND NUMBER OF PROJECT:

A Study of Tree Growth and Environment as a Basis for Interpretation of Dendroclimatic Series, 960-138 and 960-458.

SUPPORT:

Largely from the National Park Service; National Geographic Society; U.S. Weather Bureau, and the Research Corporation.

PERSONNEL:

Harold C. Fritts.

NATURE OF RESEARCH:

A combined field, laboratory and analytical study.

DESCRIPTION OF PROJECT:

Field studies at Mesa Verde National Park, Colorado, and on Mount Bigelow near Tucson are aimed toward providing a biological basis for the correlation of ring width with climate.

PRESENT STATUS:

Active.

RESULTS:

Several measures have been made of tree-ring variability and the similarity between species and among individuals. The growth period has been determined and tentative model constructed for the tree growth-environmental relationships.

PUBLICATIONS:

"The Relevance of Dendrographic Studies to Tree-Ring Research," Harold C. Fritts, Tree-Ring Bull. 24(1-2): 9-11. 1962.

"Analysis and Evaluation of the Sources of Variation in Tree-Rings from Mesa Verde National Park," Harold C. Fritts and D. G. Smith. Mimeographed paper presented at Annual Meeting of the Am. Inst. of Biol. Sciences, Corvallis, Oregon, 13 pp, August 30, 1962.

LABORATORY OF TREE-RING RESEARCH

TITLE AND NUMBER OF PROJECT:

Dendrochronology of Bristlecone Pine (Pinus aristata Engelm.) as a Basis for the Extension of Dendroclimatic Indices. 960-292.

SUPPORT:

National Science Foundation.

PERSONNEL:

W. G. McGinnies, C. W. Ferguson, H. C. Fritts, Marvin A. Stokes.

NATURE OF RESEARCH:

Includes field and laboratory investigations.

DESCRIPTION OF PROJECT:

The project includes field and laboratory studies of bristlecone pine to provide exact date each growth ring was produced as far back as available material allows. The oldest rings on living trees were formed more than 4500 years ago. Simultaneous field studies are aimed toward determining the relation between various climatic parameters and tree ring growth. Experimental data and climatic records will be used to determine the value of bristlecone tree rings for long time climatic and streamflow interpretations. A tree-ring chronology has been established to 800 B.C. and it is expected this will be extended to 2000 B.C. by June 1963. Dated material has been furnished to radio carbon laboratories for check dating. Environmental studies were set up in the White Mountains of California in the summer of 1962.

PRESENT STATUS:

Active.

LABORATORY OF TREE-RING RESEARCH

TITLE AND NUMBER OF PROJECT:

Dendroclimatic Research.

SUPPORT:

Laboratory project.

PERSONNEL:

W. G. McGinnies, Harold C. Fritts, Wesley C. Ferguson, Marvin A. Stokes.

NATURE OF RESEARCH:

Project is a combination of analytical laboratory and field investigations. It represents about half the total research program of the tree-ring laboratory and is closely integrated with dendrochronological research.

DESCRIPTION OF PROJECT:

The project is aimed toward determining the relationship between climate and the radial growth of trees as expressed by annual rings. It includes a study of the effects of yearly variations as well as long time trends. In the western United States precipitation has an important influence on tree growth and it is hoped that the cause and effect relationships, can be identified to the point where specific climatic factors can be estimated from tree-ring information.

PRESENT STATUS:

A continuing program.

RESULTS:

Very preliminary results emphasize the importance of winter precipitation as the primary control of ring growth though in pine the precipitation regime for a 12 month period is important. A portion of the growth response is exhibited by a lag so that a small portion of climatic variation may be reflected in ring widths of the two or three following years.

PUBLICATIONS:

"An Approach to Dendroclimatology: Screening by Means of Multiple Regression Techniques," H. C. Fritts, Jour. Geophysical Res. 67(4): 1413-1420. 1962.

"The Relation of Growth Ring Widths in American Beech and White Oak to Variations in Climate," H. C. Fritts, Tree-Ring Bull. 25(1 and 2): In press. 1962.

"Dendrochronology," W. G. McGinnies, Journal of Forestry. 61(1): 5-11. 1963.

INSTITUTE OF WATER UTILIZATION

TITLE AND NUMBER OF PROJECT:

Reduction of Evaporation Losses by Using Monomolecular Films. State 507.

SUPPORT:

Agricultural Experiment Station and the U. S. Bureau of Reclamation.

PERSONNEL:

C. Brent Cluff, Sol D. Resnick, Howard Goldstein.

NATURE OF RESEARCH:

Laboratory and Field investigation, operation, development, and theory.

DESCRIPTION OF PROJECT:

(1) To develop and verify techniques for determining the effectiveness of various monomolecular films considering film, water and climatic characteristics typical of semi-arid regions.

(2) To develop a simple, effective, inexpensive apparatus for applying and maintaining a monomolecular film at maximum film pressure on ponds and reservoirs.

(3) To screen physical conditioning and spreading agents to be used with the chemicals forming monomolecular films selected under Objective 1.

(4) To develop methods for detecting the presence, extent, and pressure of a monomolecular film.

PRESENT STATUS:

Active.

RESULTS:

Initial selection and chemical testing where necessary, of the commercial fatty alcohols to be used, were accomplished. Calibration of field and laboratory equipment was completed. The laboratory phase of the program is almost completed especially with regard to the determination under controlled conditions of spreading and healing rates with time for varying temperatures and humidities. The evaporation pan testing phase is also providing useful data for application in the pond testing program. Testing in the field ponds is well under way using chemical in the following physical forms; Solid, flakes, powders, emulsions, and solutions. Considerable attention is being given to the development of dispensers for alcohols in the various physical forms.

PUBLICATIONS:

Quarterly progress reports prepared for U. S. Bureau of Reclamation. Available from Institute of Water Utilization.

INSTITUTE OF WATER UTILIZATION

TITLE AND NUMBER OF PROJECT:

Selection and Testing of Materials for Surfacing Watershed Areas. State 508.

SUPPORT:

Agricultural Experiment Station.

PERSONNEL:

Sol D. Resnick, C. Brent Cluff, Ervin Schmutz, Richard Shaw

NATURE OF RESEARCH:

Laboratory and field investigation; operation and development.

DESCRIPTION OF PROJECT:

To test plastics, butyl rubber, bitumens, cement, and other chemicals as water-proofing materials. The materials selected should have the following properties:

- a. Prevent infiltration of most of the precipitation.
- b. Bind soil sufficiently to prevent erosion.
- c. Be easy to apply, preferably by spraying on the surface of the ground.
- d. Be fairly inexpensive.

PRESENT STATUS:

Active.

RESULTS:

Analysis was completed of recording rainfall and runoff data collected for the tenth and eleventh years of operation of the Page Ranch asphalt-paved runoff area.

Twelve plots with concrete borders and volumetric measuring tanks are nearing completion. Besides conventional paving materials as plastics, chemicals selected through a screening program by the U. S. Water Conservation Laboratory will be tested.

INSTITUTE OF WATER UTILIZATION

TITLE AND NUMBER OF PROJECT:

The Effects of Algae and Molds Upon Some Hydrologic Processes of Moisture Exchange. Hatch 523, (W-73).

SUPPORT:

Agricultural Experiment Station.

PERSONNEL:

Sol D. Resnick, William F. Faust.

NATURE OF RESEARCH:

Laboratory and Field Investigation; operation and theory; Master's thesis.

DESCRIPTION OF PROJECT:

To determine the effects of algae and molds upon the vertical transfer of moisture across the soil-air interface and to evaluate the influence of these effects upon water yield.

PRESENT STATUS:

Active.

RESULTS:

One phase of the past year's work was a study of the algal-mold crusts as they occur in wild land areas with special emphasis on molds present. A second phase of the past year's work was the construction of suitable equipment for investigating the effects of algae and molds upon the hydrologic processes of runoff, infiltration, and evaporation and erosion at soil surfaces.

PUBLICATIONS:

Yearly progress reports prepared for CSESS. Available from Institute of Water Utilization.

INSTITUTE OF WATER UTILIZATION

TITLE AND NUMBER OF PROJECT:

Climatic Patterns and Their Effect on Arizona Agriculture. Hatch 541. (W-48)

SUPPORT:

Agricultural Experiment Station, Institute of Atmospheric Physics.

PERSONNEL:

Sol D. Resnick, P. C. Kangieser, W. D. Sellers, Christine Green.

NATURE OF RESEARCH:

Analytical; operation and theory.

DESCRIPTION OF PROJECT:

(1) To record and tabulate weather data for Arizona from selected locations such as experiment stations, experiment farms and other locations of importance to agriculture and forestry, on coded machine cards so as to make them available for research.

(2) For a network of stations, analyze the precipitation data for determination of probabilities for weekly periods and combination of weekly periods.

PRESENT STATUS:

Active.

RESULTS:

Weekly summaries of precipitation, maximum temperature, and minimum temperature data for the selected network of 19 climatological stations for the period, March 1, 1931 through February 28, 1961 were tabulated on cards for machine analysis. The Weather Bureau's procedure was used for estimating missing data.

PUBLICATIONS:

Yearly progress reports prepared for CSESS. Available from Institute of Water Utilization.

INSTITUTE OF WATER UTILIZATION

TITLE AND NUMBER OF PROJECT:

Investigation of Sites, Methods, Aquifer Deterioration Control, and Effects of Artificial Ground Water Recharge of Alluvial Basins Typical of the Arid Southwest United States. State 505.

SUPPORT:

Agricultural Experiment Station.

PERSONNEL:

L. G. Wilson, Sol D. Resnick,

NATURE OF RESEARCH:

Laboratory and Field Investigation; operation and development.

DESCRIPTION OF PROJECT:

(1) To test the various methods of ground water recharge and determine the ones best suited to arid lands. (2) To test in laboratory and field and evaluate, also considering costs, various types of flocculants and filters for removal of suspended and colloidal material from recharge water. (3) To determine the effect on the aquifer and groundwater of recharging sediment laden flood water. (4) To study the effect on groundwater and the aquifer of any bacteria which may be introduced with recharge water; identify and find methods for controlling the growth and spread of these bacteria.

PRESENT STATUS:

Active.

RESULTS:

- A. Artificial recharge experiments were conducted on a test pit at Beardsley, Arizona. Constant head and falling head infiltration experiments were performed. Seepage meter tests indicated that water below the pit surface occurred in the unsaturated state.
- B. Additional experiments were conducted to determine the effectiveness of grass filters in reducing sediment load in flood water. Coastal Bermuda was the most efficient grass of six grass varieties and one alfalfa variety tested.
- C. The investigation conducted to determine the nature of the process of sediment removal by pea gravel filters indicated that removal occurred as a result of adsorption of sediment to an organic film (schmutzdecke).

PUBLICATIONS:

- "To Save Precious Water - Bury It!" C. E. Maddox and S. D. Resnick, Progressive Agriculture in Arizona, Vol. XIV, No. 5, p. 4, Sept.-Oct., 1962.
- "Letting Grass Take the Mud Out of Water," L. G. Wilson and C. B. Cluff, Progressive Agriculture in Arizona, Vol. XIV, No. 6, p. 12, Nov.-Dec., 1962.

DEPARTMENT OF WATERSHED MANAGEMENT

TITLE AND NUMBER OF PROJECT:

Evaporation, Transpiration and Evapotranspiration from Soils Under Varying Soil Moisture and Solar Radiation Levels. 509-D.

SUPPORT:

Agricultural Experiment Station in cooperation with the Soil Conservation Service of the U. S. Department of Agriculture.

PERSONNEL:

A. L. McComb, P. B. Rowe, Howard G. Halverson.

NATURE OF RESEARCH:

Analytical, laboratory, theory, Master's thesis.

DESCRIPTION OF PROJECT:

Effects of different levels of soil moisture and solar radiation on evaporation, transpiration and evapotranspiration were measured by use of 8 groups of fifteen, 10-inch plastic pots. Each pot contained a forest soil collected from a mixed stand of ponderosa pine (Pinus ponderosa) and Douglas fir (Pseudotsuga taxifolia). Evaporation was studied by using pots containing soil only, transpiration by using pots containing two-year-old Aleppo pine (Pinus halepensis) seedlings with the soil sealed to prevent evaporation, and evapotranspiration by using pots containing tree seedlings with the surface soil exposed.

PRESENT STATUS:

Completed.

RESULTS:

Water losses (transpiration and evapotranspiration) from the potted seedlings were closely correlated with a soil moisture and to a lesser degree with solar radiation. Evaporation from a bare soil surface, on the other hand, was significantly related only to soil moisture. In all cases, the greater the soil moisture, the greater the rate of water loss. This indicates that in the management of vegetation to reduce water loss, emphasis should be placed on methods of reducing the availability of soil water to direct evaporation.

PUBLICATIONS:

"Transpiration and Evapotranspiration with Aleppo Pine (Pinus halepensis Mill.) Seedlings Under Varying Soil Moisture and Solar Radiation Levels". Howard G. Halverson, Thesis, The University of Arizona: 58 pp. (typed), illus. May 15, 1962.

DEPARTMENT OF WATERSHED MANAGEMENT

TITLE AND NUMBER OF PROJECT:

The Development and Testing of Methods for Determining Evaporation, Transpiration and Evapotranspiration in Pine Stands by Soil Moisture Sampling. 509-D.

SUPPORT:

Department of Watershed Management in cooperation with U. S. Bureau of Indian Affairs, White Mt. Apache Tribe & Southwest Forest Industries, McNary, Arizona.

PERSONNEL:

A. L. McComb, P. B. Rowe, Hilton Lee Silvey.

NATURE OF RESEARCH:

Analytical and field investigation, development and operation; Master's thesis.

DESCRIPTION OF PROJECT:

Study designed to develop and test a method for measuring the evaporation and transpiration components of evapotranspiration in mature ponderosa pine stands in central Arizona. Installation consisted of twelve, 14 x 18' foot trenched plots - 3 with bare soil, 3 with a mature ponderosa pine cover, 3 with a vegetation free soil covered with plastic sheeting, and 3 with mature ponderosa pine and ground covered with plastic sheeting. Soil moisture supplied by natural rainfall, supplemented by irrigation. Soil moisture storage, percolation through the soil, and evaporative losses were determined for each treatment by periodic soil moisture sampling and allied meteorological observations.

PRESENT STATUS:

Completed.

RESULTS:

The individual processes involved in the disposition of precipitation (evaporation, transpiration, soil moisture storage, and percolation through the root zone), and the effects of vegetation on these processes can be evaluated through the use of plastic sheeting, soil moisture sampling and allied climatic measurements. Such information is basic to predicting potential effects of vegetation manipulation on both on-site and off-site water yields.

PUBLICATIONS:

"A Method for Determining Evaporation, Transpiration and Evapotranspiration in Pine Stands by Soil Moisture Sampling." Hilton Lee Silvey, Thesis; The University of Arizona, 84 pp. (typed), illus. May 25, 1962.

DEPARTMENT OF WATERSHED MANAGEMENT

TITLE AND NUMBER OF PROJECT:

A Comparison of the Structure, Bulk Density, Infiltration Capacity and Permeability of a Soil Under Grazed and Ungrazed Grass, and Grazed and Ungrazed Grass-Juniper Vegetation. 509-D.

SUPPORT:

Department in cooperation with the Forest Service of the U. S. Department of Agriculture.

PERSONNEL:

P. B. Rowe, A. L. McComb, Almer D. Zander

NATURE OF RESEARCH:

Analytical, field investigation, theory, Master's thesis.

DESCRIPTION OF PROJECT:

Inventories and measurements of pertinent site characteristics were made for each of the vegetation conditions studied. These included both qualitative and quantitative descriptions of past and present land use, litter cover, and surface soil conditions. Infiltration capacity (for dry and wet soil condition) bulk density, and penetrability tests were made of the surface soil. Pits were then dug to the depth of the weathered bed rock, soil horizons differentiated, and bulk density, permeability, texture, organic matter and pH determinations made for each horizon.

PRESENT STATUS:

Field work and analyses completed, thesis in preparation.

RESULTS:

Preliminary results indicate important differences in the physical properties of the soil between the vegetation conditions studied. In the heavily grazed areas the infiltration capacities and penetrabilities were generally less and bulk densities greater than in the comparative ungrazed area. To a lesser degree, this also appears to be true for the juniper-grass as compared to the grass areas.

DEPARTMENT OF WATERSHED MANAGEMENT

TITLE AND NUMBER OF PROJECT:

Effect of Fire and Residual Ash on the Vegetation, Soil, Water Relations in Selected Ponderosa Pine Stands. 509D.

SUPPORT:

Department in cooperation with U.S. Bureau of Indian Affairs, White Mt. Apache Tribe.

PERSONNEL:

P. B. Rowe, A. L. McComb, Malcolm J. Zwolinski.

NATURE OF RESEARCH:

Analytical, laboratory and field investigations, theory, doctoral dissertations.

DESCRIPTION OF PROJECT:

The study will include a series of laboratory and field experiments to evaluate the influences of wild fire and controlled burning on the chemical and physical properties of a forest soil as these may affect the basic processes of surface and soil water movements. Laboratory studies will be carried on to determine changes in the structure, pore space, and chemical characteristics of the soil due to burning of the ground cover. Field studies employing North Fork type infiltrometers, soil and soil moisture sampling will be carried on to supplement and extend the results of the laboratory studies.

PRESENT STATUS:

Active

RESULTS:

Preliminary studies and literature review indicate conflicting and inclusive evidence of the effects of ash residue on water-soil relations.

EXHIBIT 2

**OKLAHOMA STATE UNIVERSITY • STILLWATER**

Office of the President
FRontier 2-6211, Ext. 201

January 29, 1963

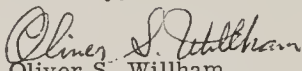
Senator Clinton P. Anderson
Committee on Interior and Insular Affairs
Senate Office Building
Washington, D. C.

Dear Senator Anderson:

My letter of June 12, 1962, indicating research activity in the field of Water Resources, I find was incomplete. Accordingly I would appreciate having that report amended by the attached information. Oklahoma State University has been concerned with the water resources problem of Oklahoma during most of the years of the University's operation. A continuing program in the Sanitary Engineering field began in 1922 which has provided information and services for municipal and industrial users of water throughout the intervening years.

We recognize the primary importance of water resources which were, for many years, so eloquently described by the late Senator Kerr. We support the investment in acquiring a more complete and accurate understanding of water conservation and utilization.

Sincerely,


Oliver S. Willham
P r e s i d e n t

Attachments

WATER RESOURCES RESEARCH
OKLAHOMA STATE UNIVERSITY
STILLWATER, OKLAHOMA

School of Civil Engineering and
Office of Engineering Research
College of Engineering

The research program in water resources within the School of Civil Engineering involves a wide range of subject material. Research is in progress in subject material related to water quality, reduction of water pollution, and water conditioning. Graduate students are utilized in the various research projects such that while accomplishing the end results of the research, professional personnel are educated in modern research methods and procedures in the area of water resources engineering. A continuing program in cooperation with the Oklahoma Water and Pollution Control Association of adult education has been conducted by this school since 1922. Research papers and discussions have been presented at the Oklahoma Industrial Wastes Conference and at the Water and Pollution Control Short Courses.

- (1) Project: Kinetics and Mechanism in Activated Sludge Processes

Director: Anthony F. Gaudy, Jr.

Sponsor: Department of Health, Education and Welfare

Purpose and Objectives: A study of various physical and chemical factors which affect system kinetic behavior, substrate partition and substrate removal in continuous-flow activated sludge units.

- (2) Project: Response of Activated Sludge to Organic Shock Loads

Director: Anthony F. Gaudy, Jr.

Sponsor: Department of Health, Education and Welfare

Purpose and Objectives: An integrated investigation using both batch and continuous flow conditions of various changes in environment, or shock loads, to which an activated sludge is subjected during the course of waste purification.

- (3) Project: Bio-Engineering

Director: Anthony F. Gaudy, Jr.

Sponsor: Department of Health, Education and Welfare

Purpose and Objectives: A graduate training program at the Ph.D. level with special emphasis on education for research in water supply and pollution control.

- (4) Project: Cryostatic Collection of Organic Materials from Aqueous Media

Director: Louis Hemphill

Sponsor: An institutionally supported project

Purpose and Objectives: Development of a method and apparatus, based on using an inert carrier gas for the mass transfer and low temperature "cold trap" condensers, for collecting organic material from natural water.

- (5) Project: Differential Thermal Analysis

Director: Louis Hemphill

Sponsor: An institutionally supported project

Purpose and Objectives: Development of a differential thermal analyzer which will permit investigation of energy distribution in samples of environmental interest.

- (6) Project: Sorption of Organic Materials on Clay Minerals in Solution

Director: Louis Hemphill

Sponsor: An institutionally supported project

Purpose and Objectives: Determination of the affinity of clay minerals in aqueous solution for sorbing organic materials having relatively high toxicity.

- (7) Project: Controlled Temperature Synthetic Feed Aerobic Sludge Digestion

Director: Quintin B. Graves

Sponsor: An institutionally supported project

Purpose and Objectives: A determination of the value of aerobic sludge digestion. A synthetic sludge is used to eliminate variable strength and composition of the sludge. The temperature is controlled to determine the effects of temperature on aerobic digestion. The effectiveness of the process is measured by the drainability of the sludge, by the reduction in solids and by the presence or absence of odors.

- (8) Project: Industrial Hygiene, Radiological Health, Water Pollution Control and Air Pollution Control

Director: Quintin B. Graves

Sponsor: Department of Health, Education and Welfare

Purpose and Objectives: A graduate training program in sanitary and public health engineering including water resources as affected by wastes.

School of Electrical Engineering and
Office of Engineering Research
College of Engineering

The research program related to water resources within the School of Electrical Engineering involves the storing of energy as shown in the following project:

- (1) Project: Energy Storage Project

Director: William L. Hughes and C. M. Summers

Sponsor: University

Purpose and Objectives: Basic work is being done in developing means of storing energy. This has direct application in making better use of the energy developed at hydroelectric plants since water can be used for both irrigation and power, the energy being stored for later use.

School of Agricultural Engineering
College of Engineering
College of Agriculture and
Oklahoma Agricultural Experiment Station

The program of research in water resources within the School of Agricultural Engineering involves research on reduction of evaporation from reservoirs, effective use of limited irrigation of water supplies, the hydraulics of overland flow, hydrologic studies on small grass-covered watersheds and farm water supply development.

- (1) Project: The Effectiveness of Monomolecular Films for Reducing Evaporation From Reservoirs

Director: F. R. Crow

Sponsor: Oklahoma Agricultural Experiment Station cooperative with U. S. Bureau of Reclamation

Purpose and Objectives: Two paired plastic lined ponds, designed for evaporation research, are being used to study various aspects of evaporation reduction by monomolecular films. Apparatus has been developed for automatic application of hexaoctadecanol slurry. Present research is on the effects of wind on monolayers and development and testing of methods of alleviating adverse effects of wind.

Evaporation reductions of 25 to 40% have been obtained in long duration tests using slurry method of applying films. Curves have been developed relating wind speed and required film application rate. In current research a system of floating barriers is used to confine the monolayer to reduce frequency of application. Various height/spacing ratios have been tested. The effect of the barriers, with and without monolayer, on evaporation is being studied.

Publications: "Reducing Reservoir Evaporation" by F. R. Crow, Agricultural Engineering, Vol. 42, No. 5, May 1961.

- (2) Project: Irrigation Engineering Studies on the Effective Use of Limited Irrigation Water Supplies

Director: James E. Garton

Sponsor: Oklahoma Agricultural Experiment Station

Purpose and Objectives: These studies are being conducted at a 240 acre irrigation research farm. In general, the research has been concerned with how a farmer can make the most effective use of a limited water supply. Experiments have been conducted on the more common irrigated crops of the area, cotton, grain sorghum, and wheat.

The research has been directed toward the following questions: What is the average seasonal use of water by various crops? How frequently should they be irrigated for maximum returns? What is the best method of determining when to irrigate?

Some work has been done on the uniformity of application with various methods of furrow irrigation. This work will be expanded with the objective being to improve the uniformity and efficiency of irrigation while at the same time reducing the labor requirement.

(3) Project: The Hydraulics of Overland Flow

Director: F. R. Crow

Sponsor: Oklahoma Agricultural Experiment Station cooperative with Agricultural Research Service, U.S. Department of Agriculture

Purpose and Objectives: A study of the basic relationships involved in the hydraulics of overland flow. Now in its initial phase, the research is being done at the Stillwater Outdoor Hydraulic Laboratory. Test channels, 96 ft. long will be subjected to simulated rainfall of various intensities and droplet sizes. The water surface profile will be studied for transient and equilibrium states for channels surfaced with cement mortar and also for earth channels vegetated with wheat.

(4) Project: Hydrologic Studies on Small Grass-Covered Watersheds

Director: F. R. Crow

Sponsor: Agricultural Experiment Station cooperative with Agricultural Research Service, U. S. Department of Agriculture

Purpose and Objectives: Measurements are being made to provide hydrologic data on total watershed runoff and peak rates of runoff from three small grass-covered watersheds in north central Oklahoma. Highway culverts, modified by the addition of weir sills, are being used as runoff measuring devices. Intensive model tests of culverts equipped with weir sills completed. Ten years data on precipitation and runoff completed.

(5) Project: Farm Water Supply Development

Director: Elmer R. Daniel

Sponsor: Oklahoma Agricultural Experiment Station

Purpose and Objectives: A study of the basic relationships involved in the design of a municipal gravity sand filtration water plant as applied to an individual surface water supply system for the farmstead.

Purification of individual water supply using ultra violet energy.

A study now in progress of pressure filtration of surface water to provide design data for a packaged treating unit. Study consists of rapid flocculation, detention, filtration, taste and odor removal, and chlorination.

Publications: "A Household Water Supply from Your Farm Pond", Cir. E-580, available through mailing room Agriculture Extension Service, Oklahoma State University.

"Ultra Violet Bacterial Disinfection of Domestic Water Supply" Elmer R. Daniel, Agricultural Engineering, Vol. 43, No. 6, pp. 344-345, 350, June 1962.

"A Packaged System for Rapid Treatment of Pond Water" by Elmer R. Daniel. Paper given at Oklahoma Section ASAE, November 30, 1962.

Aquatic Biology Laboratory
Zoology Department
Research Foundation
College of Arts and Sciences

The program of research in water resources at the Aquatic Biology Laboratory is concerned mainly with graduate thesis research. More than thirty Ph.D. degrees, and about as many M.S. degrees, have been earned in various aspects of aquatic biology. Thesis research topics have been concerned with biological effects of oil refinery and paper mill effluents; productivity of ponds and reservoirs; reaction of fishes to toxicity of oil refinery effluents, to oxygen deficiency, to temperature, and to certain chemicals; and life histories of fishes of economic importance.

Support for research at the Aquatic Biology Laboratory has come from a variety of sources.

- (1) The Oklahoma Oil Refiner's Waste Control Council has supported studies of the biological effects of oil refinery effluents since 1957. Principal investigator, Troy C. Dorris, Ph.D.
- (2) The U. S. Public Health Service, National Institutes of Health, has supported two research projects on the biological effects of oil refinery effluents.

Continuous-flow toxicity bioassay of oil refinery effluents. Principal investigator, Troy C. Dorris, Ph.D.

Relative resistance of fish species to toxicity of oil refinery effluents. Principal investigator, W. H. Irwin, Ph.D.

- (3) The U. S. Public Health Service, Division of Water Supply and Pollution Control, supports a training program for Aquatic Biologist Specialists in Water Pollution. Director, Troy C. Dorris, Ph.D.

- (4) The National Science Foundation has supported three college teacher research participation programs. Director, Troy C. Dorris, Ph.D.
- (5) Ten research fellowship and stipend grants have been received from various sources, including: National Defense Education Act, National Institutes of Health, National Science Foundation, Cooperative Wildlife Unit, and Oklahoma Game and Fish Council.

Representative selection of thesis topics since 1957.

Interaction of toxic components of oil refinery effluents.

Activities of insect populations in oil refinery effluent-holding ponds in waste improvement.

Toxicity of oil refinery effluents under conditions of continuous renewal.

Reaction of fish species to oxygen deficiency.

Relative resistance of selected species of fish to toxicity of oil refinery effluents.

Algal photosynthesis in oil refinery effluent-holding ponds.

Effect of water exchange rates on photosynthesis in farm ponds.

Plankton populations in oil refinery effluent-holding ponds.

Algal populations in kraft-mill effluent-holding ponds.

Reaction of fish species to temperature.

Life-history of the fat-head minnow.

Life-history of the thread-fin shad.

9/ 13/63

WATER RESOURCES RESEARCH CENTERS

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HEARINGS
BEFORE THE
SUBCOMMITTEE ON
IRRIGATION AND RECLAMATION
OF THE
COMMITTEE ON
INTERIOR AND INSULAR AFFAIRS
HOUSE OF REPRESENTATIVES
EIGHTY-EIGHTH CONGRESS
FIRST SESSION

ON
S. 2, H.R. 2683, H.R. 2689, H.R. 4048, H.R. 7234,
H.R. 7239, and H.R. 7258

BILLS TO ESTABLISH WATER RESOURCES RESEARCH CENTERS AT LAND-GRANT COLLEGES AND STATE UNIVERSITIES, TO STIMULATE WATER RESEARCH AT OTHER COLLEGES, UNIVERSITIES, AND CENTERS OF COMPETENCE, AND TO PROMOTE A MORE ADEQUATE NATIONAL PROGRAM OF WATER RESEARCH

JUNE 24 AND 25 ; JULY 22 AND 23, 1963

Serial No. 9—Part I
(Government witnesses)

Printed for the use of the
Committee on Interior and Insular Affairs

Dr. Byerly

U.S. GOVERNMENT PRINTING OFFICE
WASHINGTON : 1963

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WATER RESOURCES RESEARCH CENTERS

MONDAY, JUNE 24, 1963

HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON IRRIGATION AND RECLAMATION,
OF THE COMMITTEE ON INTERIOR AND INSULAR AFFAIRS,
Washington, D.C.

The subcommittee met, pursuant to notice, at 9:45 a.m., in the committee room, Longworth Building, Hon. Walter Rogers presiding.

Mr. ROGERS. The Subcommittee on Irrigation and Reclamation will come to order for the consideration of scheduled business, which is consideration of H.R. 2683, by Mr. Morris, H.R. 2689, by Mr. Teague of Texas, H.R. 4048, by Mr. Matthews, H.R. 7234, by Mr. Edmondson, H.R. 7239, by Mr. Johnson of California, H.R. 7258, by Mr. Gray, and Senate bill No. 2.

These bills are to establish water resources research centers at land-grant colleges and State universities, to stimulate water research at other colleges, universities, and centers of competence, and to promote a more adequate national program of water research.

The first three House bills are identical. However, S. 2 is considerably different due to amendments adopted by the Senate. The last three House bills are identical to S. 2 as passed by the Senate. The legislation is divided under three titles.

Title I would authorize funds for distribution by the Secretary of the Interior to land-grant or other State-designated institutions for the purposes of establishing water resources research institutions. Additional funds would also be authorized which the Secretary could use to match funds made available to the institutes by the States or by other sources.

Title II of the bill would authorize additional appropriations to the Secretary of the Interior from which he could make grants, contracts, or other arrangements with Government or private agencies and institutions.

Title III contains certain miscellaneous provisions relating to the administration's programs under the act.

The committee has received reports on the legislation from the Department of the Interior, the Office of Science and Technology, the Bureau of the Budget, the General Accounting Office, the Department of Agriculture, the Department of the Army, and the Department of Health, Education, and Welfare.

The Senate bill and H.R. 2683 will be placed in the record along with the reports that have been received, with proper reference being made to H.R. 2689, H.R. 4048, H.R. 7234, H.R. 7239, and H.R. 7258. (H.R. 2683, S. 2, and the reports referred to follow:)

[H.R. 2683, 88th Cong., 1st sess.]

A BILL To establish water resources research centers at land-grant colleges and State universities, to stimulate water research at other colleges, universities and centers of competence, and to promote a more adequate national program of water research

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That it is the policy and purpose of the Congress to assure the Nation at all times an abundance of water, both as to quantities and quality, necessary to meet the requirements of its expanding population, and, to help achieve this objective, to stimulate, sponsor, and provide for the conduct of research, investigations, and experiments in the field of water and related resources as they affect water, supplementing present programs, and to encourage the training of scientists in fields related to water by assistance to colleges and universities in the development of water resources research programs.

TITLE I--STATE WATER RESOURCES RESEARCH INSTITUTES OR CENTERS

SEC. 100. (a) There is authorized to be appropriated, for the fiscal year 1964 and subsequent years, for distribution to a college or university in each State and Puerto Rico, established in accordance with an Act approved July 2, 1862 (12 Stat. 503), entitled "An Act donating public lands to the several States and territories which may provide colleges for the benefit of agriculture and the mechanic arts", or such other institutions of higher education as any State shall determine, a sum adequate to provide \$75,000 to each State in the first year to be increased by \$12,500 each succeeding fiscal year for two years and to continue at \$100,000 thereafter, for the purpose of establishing a collegewide or universitywide water resources research institute, center, or equivalent agency. It shall be the duty of each such institute or center to plan and conduct and/or arrange for a component or components of its college or university to conduct competent researches, investigations, or experiments, of either a basic or practical nature, or both, in relation to water resources, including but not limited to aspects of the hydrological cycle, supply and demand for water, conservation and best use of available supplies, methods of increasing such supplies, economic, legal, social, engineering, recreation, biological, geographic, ecological, and other aspects of water problems, as may in each case be deemed advisable, having due regard to the varying conditions and needs of the respective States and Puerto Rico, to water research projects being conducted by agencies of the Federal Government, and to those related to agriculture being conducted by the agricultural experiment stations, and also having regard to avoidance of any undue displacement of scientists and engineers elsewhere engaged in water resources research.

(b) There is further authorized to be appropriated to the Secretary of the Interior in the fiscal year 1964 the sum of \$1,000,000, increasing by \$1,000,000 each year for four years to \$5,000,000 in fiscal year 1968 and thereafter, which the Secretary of the Interior may use to match, on a dollar for dollar basis, funds made available to State water resources research institutes or centers by the States or other non-Federal sources, to meet the necessary expenses of water resources research projects which could not otherwise be undertaken, including the expense of planning and coordinating regional water resources research projects by two or more State water research agencies.

SEC. 101. Sums available to the States under the terms of section 100(a) of this Act shall be paid to the designated institution or institutions in each State in equal quarterly payments beginning on the first day of July of each fiscal year upon vouchers approved by the Secretary of the Interior. Each such agency authorized to receive funds shall have an officer appointed by its governing authority who shall receive and account for all funds paid to the State under the provisions of this Act and shall make an annual report to the Secretary of the Interior, on or before the first day of September of each year, on work accomplished and the status of projects underway together with a detailed

statement of the amount received under any of the provisions of this Act during the preceding fiscal year, and of its disbursement, on schedules prescribed by the Secretary of the Interior. If any of the moneys received by the authorized receiving officer of any State water resources research agency under the provisions of this Act shall by any action or contingency be found by the Secretary of the Interior to have them improperly diminished, lost, or misapplied, it shall be replaced by the State concerned and until so replaced no subsequent appropriation shall be allotted or paid to such States. Pending a meeting of the legislature of any State, the Secretary of the Interior shall pay sums appropriated pursuant to section 100 of this Act to a qualified institution designated by the Governor of such State.

SEC. 102. Moneys appropriated pursuant to this Act shall also be available, in addition to meeting expenses for research and investigations conducted under authority of this Act, for printing and disseminating the results of such research, retirement of employees subject to the applicable provisions of the Act approved March 4, 1940 (54 Stat. 39), administrative planning and direction, and for the purchase and rental of land and the construction, acquisition, alteration, or repair of buildings necessary for conducting research. The State water resources research agencies are authorized to plan and conduct any research authorized under this Act in cooperation with each other and such other agencies and individuals as may contribute to the solution of the water problems involved, and moneys appropriated pursuant to this Act shall be available for paying the necessary expenses of planning, coordinating, and conducting such cooperative research. Two or more States may cooperate in the designation of a single interstate or regional research institute or center.

SEC. 103. Bulletins, reports, periodicals, reprints of articles, and other publications necessary for the dissemination of results of the researches and experiments, including lists of publications available for distribution by the institutions, shall be transmitted in the mails of the United States under penalty indicia: *Provided, however,* That each publication shall bear such indicia as are prescribed by the Postmaster General and shall be mailed under such regulations as the Postmaster General may from time to time prescribe. Such publications may be mailed from the principal place of business of the institute or center, or from an established subunit of such agency.

SEC. 104. The Secretary of the Interior is hereby charged with the responsibility for the proper administration of this Act, and, after full consultation with other Federal agencies, is authorized and directed to prescribe such rules and regulations as may be necessary to carry out its provisions, including requirement of a showing that agencies designated to receive funds have, or may reasonably be expected to have, the capability of doing effective work. It shall be the duty of the Secretary to furnish such advice and assistance as will best promote the purposes of this Act, including participation in coordination of research initiated under this Act by the State water resources research agencies, from time to time, to indicate such lines of inquiry as to him seem most important, and to encourage and assist in the establishment and maintenance of cooperation by and between the several State water resources research agencies and between the State agencies and the United States Department of the Interior and other Federal establishments.

On or before the 1st day of July in each year after the passage of this Act, the Secretary of the Interior shall ascertain as to each State whether it is entitled to receive its share of the annual appropriations for water resources research under section 100(a) of this Act and the amount which thereupon each is entitled, respectively, to receive.

The Secretary of the Interior shall make an annual report to the Congress of the receipts and expenditures and work of the water resources research agencies in all States under the provisions of this Act and also whether any portion of the appropriation available for allotment to any State has been withheld and if so the reasons therefor.

SEC. 105. Nothing in this Act shall be construed to impair or modify the legal relation existing between any of the colleges or universities under whose direction State water resources research institutes or centers are established and the government of the States in which they are respectively located: *Provided,* That in any State which designates more than one such college or university to have a water resources research center the appropriations made pursuant to section 100(a) of this Act for such State shall be divided between such institutions as the legislature of such State shall direct: *Provided further,* That in any instance

where two or more States designate a single interstate or regional institute or center, the funds of each of the States under section 100(a) may, upon the direction of the States, be paid to the designated agency.

TITLE II—ADDITIONAL WATER RESOURCES RESEARCH PROGRAMS

SEC. 200. There is authorized to be appropriated to the Secretary of the Interior \$5,000,000 in fiscal year 1964, increasing \$1,000,000, annually for five years, and continuing at \$10,000,000 annually thereafter from which he may make grants, contracts, matching, or other arrangements with educational institutions, private foundations, or other institutions; with private firms and individuals; and with local, State, or Federal Government agencies, to undertake research into any aspects of water problems related to the mission of the Department of the Interior, which may be deemed desirable and are not otherwise being studied.

TITLE III—MISCELLANEOUS PROVISIONS

SEC. 300. The Secretary of the Interior shall arrange for the regular advice and cooperation of all agencies of the Federal Government concerned with water problems, of State and local governments and of private institutions and individuals, to assure that the programs authorized in this Act will supplement and not duplicate established water research programs, to stimulate research in otherwise neglected areas, and to contribute to a comprehensive, nationwide program of water and related resources research. He shall make generally available information and reports on projects completed, in progress, or planned under the provisions of this Act, in addition to any direct dissemination of information by the research agencies themselves. Each Federal agency doing water resources research or investigations shall advise the Secretary of the Interior at least once annually of work underway or scheduled by it. The Secretary of the Interior shall classify and maintain for general use a catalog of water resources research and investigation projects in progress or scheduled by Federal agencies, and by such non-Federal agencies of government, colleges, universities, private institutions, firms and individuals as may make voluntarily available information to him: *Provided*, That upon the establishment of a central or general system of cataloging current and projected scientific research in all fields encompassing the cataloging function herein authorized, the President may transfer this function as he determines to be desirable.

SEC. 301. Nothing in the foregoing section nor in this Act is intended nor shall be construed as giving its Secretary or the Department of the Interior any authority or surveillance over water resources research conducted by any other agency of the Federal Government, nor shall it be construed as repealing, superseding, or diminishing existing authorities or responsibilities of any agency of the Federal Government to plan and conduct, contract for, or assist in research in its areas of responsibility and concern with water resources.

SEC. 302. The Secretary of the Interior is authorized to establish in the Department of the Interior a Water Resources Service for the purpose of administering programs authorized in this Act.

SEC. 303. Not to exceed 4 per centum of any funds appropriated pursuant to the provisions of this Act may be used for the purpose of administration. The Secretary of the Interior is authorized to employ a director of the Water Resources Service at civil service grade 18 and, if necessary to obtain personnel competent to administer a program involving scientific knowledge and highly trained staffs, he may employ not to exceed five employees above civil service grade 15 in addition to the number otherwise authorized by law.

SEC. 304. Contracts or other arrangements for water resources research work authorized under this Act may be undertaken without regard to the provisions of section 3684 of the Revised Statutes (31 U.S.C. 529) when in the judgment of the Secretary of the Interior such payments are necessary to facilitate such research.

SEC. 305. Within not more than a year following the fifth year of operation of this Act, the Secretary of the Interior shall prepare and submit to the President for transmittal to the Senate and House of Representatives a comprehensive report on progress and accomplishments under the Act, together with his recommendations on revisions of the Act, and with the independent recommendations of the governing authorities of the State colleges and universities on desirable revisions. This section is not intended to preclude any interim recommendations deemed desirable.

SEC. 306. This Act may be known as the "Water Resources Research Act."

[S. 2, 88th, Cong., 1st sess.]

AN ACT To establish water resources research centers at land-grant colleges and State universities, to stimulate water research at other colleges, universities, and centers of competence, and to promote a more adequate national program of water research

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That it is the policy and purpose of the Congress to assure the Nation at all times an abundance of water, both as to quantities and quality, necessary to meet the requirements of its expanding population, and, to help achieve this objective, to stimulate, sponsor, and provide for the conduct of research, investigations, and experiments in the field of water and related resources as they affect water, supplementing present programs, and to encourage the training of scientists in fields related to water by assistance to colleges and universities in the development of water resources research programs.

TITLE I—STATE WATER RESOURCES RESEARCH INSTITUTES OR CENTERS

SEC. 100. (a) There is authorized to be appropriated, for the fiscal year 1964 and subsequent years, for distribution to a college or university in each State and Puerto Rico, established in accordance with an Act approved July 2, 1862 (12 Stat. 503), entitled "An Act donating public lands to the several States and territories which may provide colleges for the benefit of agriculture and the mechanic arts", or such other institutions of higher education as any State shall determine, a sum adequate to provide \$75,000 to each State in the first year, to be increased by \$12,500 each succeeding fiscal year for two years and to continue at \$100,000 thereafter, for the purpose of establishing a collegewide or universitywide water resources research institute, center, or equivalent agency: *Provided*, That a State may designate both a college (or university) established in accordance with said Act approved July 2, 1862 (12 Stat. 503), and one or more other institutions of higher education for this purpose. It shall be the duty of each such institute or center to plan and conduct and/or arrange for a component or components of its college or university to conduct competent researches, investigations, or experiments, of either a basic or practical nature, or both, in relation to water resources, including but not limited to aspects of the hydrological cycle, supply and demand for water, conservation and best use of available supplies, methods of increasing such supplies, economic, legal, social, engineering, recreation, biological, geographic, ecological, and other aspects of water problems, as may in each case be deemed advisable, having due regard to the varying conditions and needs of the respective States and Puerto Rico, to water research projects being conducted by agencies of the Federal Government, and to those related to agriculture being conducted by the agricultural experiment stations, and also having regard to avoidance of any undue displacement of scientists and engineers elsewhere engaged in water resources research.

(b) There is further authorized to be appropriated to the Secretary of the Interior in the fiscal year 1964 the sum of \$1,000,000, increasing by \$1,000,000 each year for four years to \$5,000,000 in fiscal year 1968 and thereafter, which the Secretary of the Interior may use to match, on a dollar for dollar basis, funds made available to State water resources research institutes or centers by the States or other non-Federal sources, to meet the necessary expenses of water resources research projects which could not otherwise be undertaken, including the expense of planning and coordinating regional water resources research projects by two or more States water research agencies.

SEC. 101. Sums available to the States under the terms of section 100(a) of this Act shall be paid to the designated institution or institutions in each State in equal quarterly payments beginning on the first day of July of each fiscal year upon vouchers approved by the Secretary of the Interior. Each such agency authorized to receive funds shall have an officer appointed by its governing authority who shall receive and account for all funds paid to the State under the provisions of this Act and shall make an annual report to the Secretary of the Interior, on or before the first day of September of each year, on work accomplished and the status of projects underway together with a detailed statement of the amount received under any of the provisions of this Act during the preceding fiscal year, and of its disbursement, on schedules prescribed by the Secretary of the Interior. If any of the moneys received by the authorized receiving officer of any State water resources research agency

under the provisions of this Act shall by any action or contingency be found by the Secretary of the Interior to have been improperly diminished, lost, or misapplied, it shall be replaced by the State concerned and until so replaced no subsequent appropriation shall be allotted or paid to such States. Pending a meeting of the legislature of any State, the Secretary of the Interior shall pay sums appropriated pursuant to section 100 of this Act to a qualified institution designated by the Governor of such State.

SEC. 102. Moneys appropriated pursuant to this Act shall also be available, in addition to meeting expenses for research and investigations conducted under authority of this Act, for printing and disseminating the results of such research, retirement of employees subject to the applicable provisions of the Act approved March 4, 1940 (54 Stat. 39) administrative planning and direction, and for the purchase and rental of land and the construction, acquisition, alteration, or repair of buildings necessary for conducting research. The State water resources research agencies are authorized to plan and conduct any research authorized under this Act in cooperation with each other and such other agencies and individuals as may contribute to the solution of the water problems involved, and moneys appropriated pursuant to this Act shall be available for paying the necessary expenses of planning, coordinating, and conducting such cooperative research. Two or more States may cooperate in the designation of a single interstate or regional research institute or center.

SEC. 103. (a) Paragraph (1) of section 4152(a) of title 39, United States Code, is amended by striking the word "and" at the end of subparagraph (E) and by adding the following at the end of subparagraph (F) : "and

"(G) Any institute or center engaged in activities authorized by the Water Resources Research Act consisting of bulletins, reports, periodicals, reprints of articles, and other publications necessary for the dissemination or results of researches and experiments within the scope of the Act, as determined by the Secretary of the Interior, mailed from the principal place of business of the institute or center, or from an established subunit of the same."

(b) Section 4156 of title 39, United States Code, is amended by adding a new subsection (d) as follows :

"(d) The Department of Interior shall transfer to the Post Office Department as postal revenue out of any appropriation made to it for that purpose the equivalent amount of postage, as determined by the Postmaster General, for penalty mailings under section 4152(a) (1) (G) of this title."

SEC. 104. The Secretary of the Interior is hereby charged with the responsibility for the proper administration of this Act, and, after full consultation with other Federal agencies, is authorized and directed to prescribe such rules and regulations as may be necessary to carry out its provisions, including requirement of a showing that agencies designated to receive funds have, or may reasonably be expected to have, the capability of doing effective work. It shall be the duty of the Secretary to furnish such advice and assistance as will best promote the purposes of this Act, including participation in coordination of research initiated under this Act by the State water resources research agencies, from time to time, to indicate such lines of inquiry as to him seem most important, and to encourage and assist in the establishment and maintenance of cooperation by and between the several State water resources research agencies and between the State agencies and the United States Department of the Interior and other Federal establishments.

On or before the 1st day of July in each year after the passage of this Act, the Secretary of the Interior shall ascertain whether the requirements of section 101 have been met as to each State whether it is entitled to receive its share of the annual appropriations for water resources research under section 100(a) of this Act and the amount which thereupon each is entitled, respectively, to receive.

The Secretary of the Interior shall make an annual report to the Congress of the receipts and expenditures and work of the water resources research agencies in all States under the provisions of this Act and also whether any portion of the appropriation available for allotment to any State has been withheld and if so the reasons therefor.

SEC. 105. Nothing in this Act shall be construed to impair or modify the legal relation existing between any of the colleges or universities under whose direction State water resources research institutes or centers are established and the government of the States in which they are respectively located : *Provided*, That in any State which designates more than one such college or university to have a water resources research center the appropriations made pursuant to section 100(a) of this Act for such State shall be divided between such institutions as

the legislature of such State shall direct: *Provided further*, That in any instance where two or more States designate a single interstate or regional institute or center, the funds of each of the States under section 100(a) may, upon the direction of the States, be paid to the designated agency.

TITLE II—ADDITIONAL WATER RESOURCES RESEARCH PROGRAMS

SEC. 200. There is authorized to be appropriated to the Secretary of the Interior \$5,000,000 in fiscal year 1964, increasingly \$1,000,000 annually for five years, and continuing at \$10,000,000 annually thereafter from which he may make grants, contracts, matching, or other arrangements with educational institutions, private foundations, or other institutions; with private firms and individuals; and with local, State, or Federal Government agencies, to undertake research into any aspects of water problems related to the mission of the Department of the Interior, which may be deemed desirable and are not otherwise being studied.

TITLE III—MISCELLANEOUS PROVISIONS

SEC. 300. The Secretary of the Interior shall arrange for the regular advice and cooperation of all agencies of the Federal Government concerned with water problems, of State and local governments and of private institutions and individuals, to assure that the programs authorized in this Act will supplement and not duplicate established water research programs, to stimulate research in otherwise neglected areas, and to contribute to a comprehensive, nationwide program of water and related resources research. He shall make generally available information and reports on projects completed, in progress, or planned under the provisions of this Act, in addition to any direct dissemination of information by the research agencies themselves. Each Federal agency doing water resources research or investigations shall advise the Secretary of the Interior at least once annually of work underway or scheduled by it. The Secretary of the Interior shall classify and maintain for general use a catalog of water resources research and investigation projects in progress or scheduled by Federal agencies, and by such non-Federal agencies of government, colleges, universities, private institutions, firms and individuals as may make voluntarily available information to him: *Provided*, That upon the establishment of a central or general system of cataloging current and projected scientific research in all fields encompassing the cataloging function herein authorized, the President may transfer this function as he determines to be desirable.

SEC. 301. Nothing in the foregoing section nor in this Act is intended nor shall be construed as giving its Secretary or the Department of the Interior any authority or surveillance over water resources research conducted by any other agency of the Federal Government, nor shall it be construed as repealing, superseding, or diminishing existing authorities or responsibilities of any agency of the Federal Government to plan and conduct, contract for, or assist in research in its areas of responsibility and concern with water resources.

SEC. 302. Contracts or other arrangements for water resources research work authorized under this Act with an educational institution or non-profit organization may be undertaken without regard to the provisions of section 3684 of the Revised Statutes (31 U.S.C. 529) when in the judgment of the Secretary of the Interior advance payments of initial expense are necessary to facilitate such research.

SEC. 303. Within two years following enactment of this Act, and annually thereafter, the Secretary of the Interior shall prepare and submit to the President for transmittal to the Senate and House of Representatives a comprehensive report on progress and accomplishments under the Act, together with his recommendations on revisions of the Act, and with the independent recommendations of the governing authorities of the State colleges and universities on desirable revisions.

SEC. 304. No part of any appropriated funds may be expended pursuant to authorization given by this Act for any scientific or technological research or development activity unless such expenditure is conditioned upon provisions determined by the Secretary of the Interior, with the approval of the Attorney General, to be effective to insure that all information, uses, products, processes, patents, and other developments resulting from that activity will (with such exceptions and limitations as the Secretary may determine after consultation with the Secretary of Defense to be necessary in the interest of the national defense) be made freely and fully available to the general public. Nothing con-

tained in this subsection shall deprive the owner of any background patent relating to any such activity of any right which that owner may have under that patent.

SEC. 305. This Act may be known as the "Water Resources Research Act."
Passed the Senate April 23, 1963.

Attest:

FELTON M. JOHNSTON,
Secretary.

DEPARTMENT OF THE INTERIOR,
OFFICE OF THE SECRETARY,
Washington, D.C., June 21, 1963.

HON. WAYNE N. ASPINALL,
*Chairman, Committee on Interior and Insular Affairs,
House of Representatives, Washington, D.C.*

DEAR MR. ASPINALL: This responds to your request for the views of this Department on H.R. 2683, H.R. 2689, H.R. 4048, and S. 2, similar bills to establish water resources research centers at land-grant colleges and State universities, to stimulate water research at other colleges, universities, and centers of competence, and to promote a more adequate national program of water research. The bills provide that the legislation would be known as the Water Resources Research Act.

We strongly recommend enactment of this legislation. It will make a notable contribution to the advancement of the knowledge on which sound decisions on the conservation, utilization, and development of our water resources must be based.

Title I of the bills authorizes the Secretary of the Interior to provide financial assistance to States and Puerto Rico in the annual amount of \$75,000 the first year, increasing to \$100,000 the third year and thereafter, for the purpose of establishing a collegewide or universitywide water resources research institute, center, or equivalent agency at a land-grant college or such other institution of higher education as the State may determine. When desired by the individual State, the formula money may be shared among more than one institution or may be paid to a regional center. Each such center would have the responsibility to plan and conduct or arrange for components of colleges or universities to conduct a broad program of basic or applied research relating to water resources. In addition, title I authorizes appropriations to the Secretary of the Interior in the amount of \$1 million the first year, increasing to \$5 million annually the fifth year and thereafter, for grants to the centers for the necessary expenses of water resources research projects, including related costs for administration, buildings, and equipment. The Federal contribution to the cost of such research would be matched on a cash equivalent basis by the States or other non-Federal sources.

Title II authorizes appropriations to the Secretary of the Interior in the amount of \$5 million the first year, increasing to \$10 million annually the fifth year and thereafter for research grants to or contracts with institutions, firms, and governmental agencies for research into any aspects of water problems related to the mission of the Department of the Interior.

Title III contains miscellaneous provisions.

The proposed Water Resources Research Act is addressed to one of the most important problems which will confront this Nation with increasing severity in the years ahead. It is axiomatic that the availability of adequate supply of good quality water affects all of man's pursuits. Yet we are now using all of the readily available water supply, and use requirements will double by 1980. By that time many regions of the country will be faced with potential water shortages. The competing demands for water for its many purposes will render even more critical the need for wise decisions as to its use. The correctness of these choices in turn will depend in a large measure on the availability and quality of our knowledge about water in its many aspects. The Water Resources Research Act will promote the acquisition of this knowledge by supplementing the existing Federal, State, and private activities in the field of water research and investigation.

The provisions of the proposed Water Resources Research Act represent the consensus of many experts in and out of government who have studied our water resources research programs over the period of a number of years. The approach stated in the legislation is adapted from the pattern of the highly successful Hatch Act under which college-based agriculture experiment stations in the

States have contributed so successfully to the improvement of agricultural production in this country.

Central to the significance of the legislation is the establishment of water resources research centers at land-grant colleges or other institutions of higher education. All studies of this field of research have pointed to the critically limited availability of competent research scientists and engineers in the disciplines related to water resources. The key importance of utilizing institutions of higher education both for enlarging our knowledge through research and for training scientists and engineers is attested by a distinguished series of authorities. As stated in the President's Science Advisory Committee's 1960 Report of the Panel on Basic Research and Graduate Education, "Science and the Making of Scientists Go Best Together." In the words of Prof. Abel Wolman, Chairman of the Water Resources Study of the National Academy of Sciences-National Research Council: "At present, we have no institutional structure in the United States to take care of multidisciplinary research in water. The whole hydrosociences field is now pathetically limited for the tasks involved." Enactment of the Water Resources Research Act will serve substantially to fill this void.

The legislation will authorize the establishment of research centers or equivalent agencies in each State or region of the Nation, with participation by one or more college or university as each State may determine best suited to its needs. This will permit competent investigation to be carried forward into local and regional water problems, as well as fundamental research into the basic properties of this life-essential compound, and its supply, availability and use. Every State, every locality has its water problems. Establishment of the centers will make experts readily available to State and local officials to help solve local problems. Implicit in the bill, furthermore, is an obligation to provide a substantial amount of non-Federal financing for any State water resources research center and its research programs. This assures that such centers will be established in response to valid needs recognized by the States which they serve.

The broad concept of the nature of water resources research explicit in the proposed legislation is of key importance. As defined in the bills, such research comprehends the horizon of physical and social sciences and engineering. From our own experience in the Interior Department, we are well aware that the disciplines of economics as well as hydrology, of ecology as well as geology, of law as well as physics are essential elements in developing the knowledge required for dealing with complex water resources problems. It is especially because interdisciplinary research is essential for water resource problems that institutions of higher education can develop the needed approaches. Under appropriate arrangements for coordination, college and university faculties of engineering, agriculture, natural sciences, economic and social sciences, and law can jointly attack the many-faceted research problems.

For like reasons, it is desirable to enlist competence wherever it exists to undertake research into problems not otherwise being studied. Title II of the bills meets this objective by providing basic authority to the Secretary of the Interior for a program of extramural research into any aspects of water problems related to the mission of this Department. Under this program, research grants or contracts can be made on a matching or other basis with the State water resources research agencies or other institutions or Government agencies, or with private firms or individuals, where desirable to fulfill the requirements of a sound research program.

H.R. 2683, H.R. 2689, and H.R. 4048 are identical with S. 2 as originally introduced. Before passing the bill, the Senate adopted a number of amendments. We do not object to these changes. Section 302, authorizing the establishment of a Water Resources Service in this Department, and section 303, relating to supergrade positions, were eliminated on the assurance that the Secretary of the Interior has broad authority under Reorganization Plan No. 3 of 1950 to establish within the Department an agency to administer the program free of dominance by existing bureaus and offices, and that sufficient authority also exists for the creation of supergrade positions, so that special provision is not required to provide adequately competent and independent staff.

The new section 304 will protect the public interest in any patents which might be developed as a result of the Government-financed research. The language of the section is similar to that in the Anderson-Aspinall Act (Public Law 87-295; 75 Stat. 628). As in the case of the saline water statute, we

interpret the words "patents" and "general public" as meaning U.S. patents and the general public in the United States. Additionally, we construe the word "products" as being limited to the intellectual products of the research; i.e., the ideas resulting therefrom. To avoid possible ambiguity, we suggest that the term be clarified to read "intellectual products." In the alternative, the word "products" can be eliminated altogether, inasmuch as the thought encompassed in "products" is fully expressed in "information, uses, processes, patents, and developments."

We suggest that the second paragraph of section 104 of S. 2, as amended in the Senate, be clarified by the insertion of a comma on line 16 of page 7 between "State" and "whether" to show that the added clause referring to section 101 is not intended as a limitation on the remainder of the sentence.

Enclosed is our 5-year estimate of personnel and other costs as required by the act of July 25, 1956 (5 U.S.C. 642a). In preparing these estimates, we have anticipated that the centralized administrative staff, although high in caliber, would be quite small in numbers. It also is our intention to rely heavily on an extensive series of highly competent consultants for guidance in selection of research proposals for assistance. This would bring to the Government the best counsel in the various scientific and engineering fields available outside of the Federal Government.

The Bureau of the Budget advises that enactment of this legislation would be in accord with the program of the President.

Sincerely yours,

STEWART L. UDALL,
Secretary of the Interior.

Estimated additional man-years of civilian employment and expenditures for the first 5 years of proposed new program

	19CY	19CY+1	19CY+2	19CY+3	19CY+4
Estimated additional man-years of civilian employment:					
Supervisory and professional.....	4.5	7	9	11	12
Clerical.....	8.0	13	18	22	25
Consultants (w.a.e.).....	12.0	13	14	15	16
Total, estimated additional man-years of civilian employment.....	14.5	23	31	33	43
Estimated additional expenditures:					
Personal services.....	\$165,000	\$265,000	\$355,000	\$425,000	\$475,000
All other.....	6,700,000	10,500,000	14,000,000	16,400,000	18,500,000
Total, estimated additional expenditures.....	6,865,000	10,765,000	14,355,000	16,825,000	18,975,000

11 man-year equivalent to 300 man-days.

EXECUTIVE OFFICE OF THE PRESIDENT,
BUREAU OF THE BUDGET,
Washington, D.C., June 10, 1963.

HON. WAYNE N. ASPINALL,
Chairman, Committee on Interior and Insular Affairs,
House of Representatives,
Washington, D.C.

DEAR MR. CHAIRMAN: This is in reply to your letter of May 21, 1963, requesting the comments of this office with respect to bills (H.R. 2683, H.R. 2689, H.R. 4048, and S. 2) to establish water resources research centers at land-grant colleges and State universities, to stimulate water research at other colleges, universities and centers of competence, and to promote a more adequate national program of water research. The three House bills are identical with S. 2 except that the latter includes amendments adopted on the Senate floor prior to passage. Our comments are directed to the Senate-passed bill.

Under title I of the bill, funds would be authorized for distribution by the Secretary of the Interior to land-grant or other State designated institutions for the purpose of establishing water resources research institutes. Additional funds would also be authorized which the Secretary could use to match funds made available to the institutes by the States or by other sources.

Title II of the bill would authorize additional appropriations to the Secretary of the Interior from which he could make grants, contracts, or other arrangements with Government or private agencies and institutions. Title III contains certain miscellaneous provisions related to the administration of programs under the bill.

The provisions of S. 2 reflect a number of recommendations made by this office during its consideration in the Senate. While we concur in its objectives and the general approach outlined therein, we believe the bill is unnecessarily ambiguous as to the responsibility of the Secretary of the Interior for the administration of water resources research under title I. There is no explicit statement in the bill that the Secretary is to review research to assure its adequacy. To that end we would recommend that language such as the following be inserted as section 100(c) of the bill: "The Secretary shall approve proposals for and maintain a review of all research under this section to assure high standards of quality."

The need for clarifying the responsibility of the Secretary of the Interior for administering title I research has been intensified by Senate amendments of section 100(a) and 104 of the bill. An amendment of the latter section provides that the Secretary, in ascertaining the entitlement of States to section 100(a) funds, shall determine whether the requirements of section 101 have been met. That section deals only with fiscal accounting and auditing procedures to assure that funds have not been misapplied. The amendment could be interpreted to limit the authority of the Secretary to a mere fiscal auditing function in ascertaining the entitlement of States to section 100(a) funds. The Secretary could not be held responsible for proper administration of the program if his authority were so limited. We therefore urge that the language "this title" be substituted for "section 101" in section 104 of the bill and suggest that a comma be inserted after "State" to clarify the meaning of the provision.

In amending section 100(a) of the bill, the Senate inserted a proviso that a State may designate a land-grant institution and one or more other institutions as water resource agencies under the section. Other provisions of the bill require that such agencies demonstrate their capability for doing effective work to the satisfaction of the Secretary of the Interior before being entitled to receive title I funds. We believe proliferation of State-designated water research agencies would be undesirable since it could complicate problems of coordination and reduce program effectiveness. For this reason the bill authorizes two or more States to designate a single interstate or regional research institute when appropriate. Following similar reasoning, it would appear appropriate to designate more than one agency within a State only when special circumstances exist.

Strengthening of university water research activities through a program firmly administered by the Secretary of the Interior would constitute a major step toward meeting goals set forth by the President in the water resources area. Accordingly, enactment of legislation along these lines would be in accord with the President's program.

Sincerely yours,

PHILLIP S. HUGHES,
Assistant Director for Legislative Reference.

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE,
Washington, June 24, 1963.

HON. WAYNE N. ASPINALL,
Chairman, Committee on Interior and Insular Affairs,
House of Representatives, Washington, D.C.

DEAR MR. CHAIRMAN: This letter is in response to your requests of May 21, 1963, for a report on H.R. 2683, H.R. 2689, H.R. 4048, and S. 2, as it passed the Senate, the proposed Water Resources Research Act.

We are wholly in sympathy with the bills' basic objective to promote a more adequate national program of water research. However, for the reasons summarized below, we question the need for title I of the bills, and we are not wholly in accord with the provisions of title III.

The provisions of title II of the bills—authorizing appropriations to the Department of the Interior to be used for grants, contracts, or matching of other ar-

rangements for conducting research into aspects of water problems related to its mission (not defined in the bills)—are desirable and in accord with existing accepted methods for productive Federal research participation. They provide for the widest possible participation by scientists in research on water resources matters, permit all institutions, public and private, and all disciplines to participate, and can be administered to supply stable support for programs in universities and yet obtain flexibility in research approach. And they would give to the Secretary of the Interior research and research-support authority comparable to that which is vested in this Department under the Water Pollution Control Act in order to promote good quality water adequate for all legitimate uses.

If title II is enacted and similar authorization is provided, as it should be, for all other Federal water resources agencies that now lack such authority, there is, in our opinion, little, if any, need for the proposed title I programs under which grants would be made by the Secretary of the Interior for the establishment and support of a water resources institute or center at a land-grant college or other State-designated educational institution in each State (including Puerto Rico). However, if title I is retained, some modifications are indicated. In the first place, the complete spectrum of water resources aspects specified as subjects for desirable research and investigations to be conducted by the proposed water research agencies is necessarily of basic interest to all Federal water resources agencies. We would therefore suggest participation by other Federal departments in the formulation of the rules and regulations necessary to carry out these provisions, with the Secretary of the Interior promulgating them. Secondly, we recommend deletion of the provision of section 104 that would require the Secretary of the Interior to encourage and assist in the establishment and maintenance of cooperation between the State research agencies and Federal establishments. We have encountered no difficulties in this regard in the administration of our research programs and, from the standpoint of this Department, do not perceive any need for an intermediary agent as proposed.

Section 100(a) of S. 2 contains a proviso, added on the floor of the Senate, which would authorize a State to designate for grants for establishing a water resources research institute, center, or equivalent agency, both a land-grant college and one or more other institutions of higher education, thus implying—and the remarks of the sponsor of the amendment confirm this implication—that one of the designated institutions must be a land-grant college. We believe that this is unnecessarily restrictive.

Finally, if the provision for a central water research and investigations catalog is retained in the bills (instead of leaving this matter to administrative discretion), we recommend that the function of establishing and maintaining such a coordinating device, on the basis of reports from Federal and other agencies and organizations, be vested in the Office of Science and Technology—which already has responsibilities for review and coordination of major Federal activities in scientific research—instead of deferring its transfer, as provided in the bills, to the time when, if ever, a central catalog is established for all scientific research.

If the bills are modified as above suggested, we would have no objection to their enactment.

The Bureau of the Budget, advises that, while there is no objection to the submission of this report, the enactment of legislation along the lines of these bills would be in accord with the program of the President.

Sincerely,

ANTHONY J. CELEBREZZE, *Secretary.*

DEPARTMENT OF THE ARMY,
Washington, D.C., July 22, 1963.

HON. WAYNE N. ASPINALL,
Chairman, Committee on Interior and Insular Affairs,
House of Representatives.

DEAR MR. CHAIRMAN: Reference is made to your request to the Secretary of Defense for the views of the Department of Defense with respect to S. 2, H.R. 2683, 2689, and 4048, 88th Congress, an act and bills to establish water resources centers at land-grant colleges and State universities, to stimulate water research at other colleges, universities, and centers of competence, and to promote a more adequate national program of water research. The Department of the Army has been assigned responsibility for expressing the views of the Department of Defense on this legislation.

Title I of the proposed legislation would authorize appropriation of \$75,000 annually, increasing to \$100,000 in the third year, to each of the States to help finance a college—or universitywide water resources research institute or center. There would be authorized appropriation of an additional \$1 million, increasing to \$5 million in the fifth year, which the Secretary of the Interior would be authorized to use to match State or other non-Federal funds for specific water research projects at these institutes or centers.

Title II would authorize to be appropriated to the Secretary of the Interior \$5 million, increasing to \$10 million in the fifth year and annually thereafter, from which he would make grants or enter into contracts or make matching or other arrangements with educational institutions, private entities, or governmental agencies for research into water problems related to the Interior Department mission.

Title III of H.R. 2683, 2689, and 4048 would authorize the Secretary of the Interior to establish in the Department of the Interior a water resources service for the purpose of administering programs authorized in the bills. The Senate, in passing S. 2, eliminated the pertinent sections providing for the establishment of a new agency within the Department of the Interior. Sections 301 of S. 2 and H.R. 2683, 2689, and 4048 state that nothing in the proposed legislation is intended nor shall be construed as giving the Secretary of the Interior any authority or surveillance over water resources research conducted by any other agency of the Federal Government.

The Department of the Army believes that an expansion of State research in the water field, supplementing and complementing the water research of the Federal agencies, would be desirable. Moreover, it is believed that an increase in the grants which the Federal Government now makes to the States to encourage research would be justified by the benefits which would accrue to the Nation as a whole. Hence the basic objective of S. 2, H.R. 2683, 2689, and 4048 has the full support of the Department of the Army, on behalf of the Department of Defense.

In February 1963, the President, in transmitting to Congress the report of the Federal Council for Science and Technology's Task Group on Coordinated Water Resources Research, noted that the report represents an important step in the development of a program of coordinated water resources research recommended by the Senate Select Committee on National Water Resources. Based on the careful study of the task group on the need for legislation and other action to strengthen water resources research, the report concluded with several observations and recommendations that are pertinent to the legislation now being considered.

With respect to title II, the following statement from the Council's report is noted (pp. 211-212) :

"If use is to be made of the full potential of the universities to support water resources research and graduate education in water related fields, it is necessary that all Federal agencies engaged in such research have legislative authority and adequate funds to make grants and contracts for research at universities. Such grants are needed both at universities which are the sites of the multi-disciplinary research centers referred to earlier, and at universities which may be centers of excellence in particular fields. Authority to make such grants exists in all the water research agencies except the Department of the Interior, although, as pointed out in chapter 6, special problems exist in the Departments of Agriculture and Commerce that prevent them from giving full expression to their authorities. Also, it would be desirable to clarify, where necessary, the existing general authorities in this area held by other agencies having responsibilities in water resources research, such as the Corps of Engineers.

"It is the view of the task group that the Department of the Interior and the Corps of Engineers should be given explicit authority and the necessary funds to make grants to and contracts with educational institutions for the support of research related to their broad mission responsibilities in the field of water resources * * *."

The Department of the Army subscribes to this view, and recommends that title II be amended to provide explicit authority to undertake extramural research through various types of arrangements, including research grants, not only for the Department of the Interior, but also for the Department of the Army and for any other water resources agencies which do not now have such explicit authority.

The report concludes, with respect to the mission-oriented extramural grant programs referred to in the paragraph above (p. 212) :

"The planning and administration of the extramural grant programs of the several departments should be coordinated through the proposed Coordinating Com-

mittee on Water Resources Research of the Federal Council for Science and Technology."

After discussing the desirability of establishing and supporting multidisciplinary water resources research centers in the universities, the report further concludes (p. 213) :

"The administrative responsibility should be vested in one agency which should seek appropriations for this purpose, but the grants should be made in consultation with the other agencies having substantive interests in the field of water resources, which should participate in the drawing up of rules and regulations and criteria for evaluation. Such consultation and coordination as is necessary could be accomplished through the proposed Coordinating Committee on Water Resources Research."

The Department of the Army concurs in these conclusions, and recommends that the desirability of such arrangements for coordination of Federal support of multidisciplinary water resources research centers and of mission-oriented extramural research be recognized in those sections of the proposed legislation calling upon the Secretary of the Interior to coordinate with other agencies on programs relating to the purposes of this legislation.

This report has been coordinated within the Department of Defense in accordance with procedures prescribed by the Secretary of Defense.

The Bureau of the Budget advises that, from the standpoint of the administration's program, there is no objection to the presentation of this report for the consideration of the committee.

Sincerely yours,

CYRUS R. VANCE,
Secretary of the Army.

EXECUTIVE OFFICE OF THE PRESIDENT,
OFFICE OF SCIENCE AND TECHNOLOGY,
Washington, June 10, 1963.

Hon. WAYNE N. ASPINALL,
Chairman, Committee on Interior and Insular Affairs,
House of Representatives, Washington, D.C.

DEAR CONGRESSMAN: I am pleased to respond to your request for my comments on H.R. 2683, H.R. 2689, H.R. 4048, and S. 2.

During the last Congress, I commented extensively by letter of December 21, 1962, to Senator Anderson on the predecessor to these bills, S. 3579. I am pleased to note that many of the points raised in that letter have received favorable consideration in the language of the four bills currently pending before your committee. In that communication, I endorsed the objectives of the earlier bill in these terms :

"Legislation along the general lines of the bill could serve a useful purpose in providing additional authority and funds for a concerted approach to the problems in the field of water resources research. To carry out the additional research in water resources needed to assure an abundance of water of adequate quality requires augmentation of research in the universities to utilize more effectively their research potential, to bring to bear the several interrelated disciplines bearing on water resources, and to train the new scientists and engineers sorely needed for research and teaching in this field."

By subsequent letter to Senator Anderson of February 1, 1963, I made the following comment on S. 2 while that bill was pending before the Senate Committee on Interior and Insular Affairs.

"Based on our studies of the Federal programs and activities in water resources research, I am confident that S. 2 can contribute significantly to the strengthening of the capabilities of the colleges and universities to undertake broadly based research and analysis in the many disciplines bearing on water resources. I wish to reiterate, however, that the Government should adhere to high standards of quality in the administration of the program envisaged in S. 2. It would seem desirable to have specific language in the bill to this effect in order to make it clear to both the Government and the universities that this is the intent of the Congress."

These continue to be my views on S. 2, as that bill recently passed the Senate. In this connection, I would like to associate myself with the views of the Bureau of the Budget, expressed to you by letter today on the need to emphasize the responsibility of the Secretary of the Interior to assure that research under this legislation meets high standards of quality.

In the event that the clarifications suggested by the Bureau are not adopted, I hope that language would be present in the House proceedings to indicate the intent of Congress that the Secretary be clearly responsible for achieving research quality.

It is my belief that the effectiveness of this legislation in expanding scientific understanding in ways that can assure the sound development of the Nation's water resources will depend in no small part on the ability of the Secretary of the Interior to guide the standards of performance of research centers that receive Federal support.

Sincerely yours,

JEROME B. WIESNER.

DEPARTMENT OF AGRICULTURE,
Washington, D.C., July 9, 1963.

HON. WAYNE N. ASPINALL
*Chairman, Committee on Interior and Insular Affairs,
House of Representatives.*

DEAR MR. CHAIRMAN: We wish to thank you for your letter of May 21, 1963, giving us the opportunity to report on H.R. 2683, H.R. 2689, H.R. 4048, and S. 2. The bills are entitled, "To establish water resources research centers at land-grant colleges and State universities, to stimulate water research at other colleges, universities, and centers of competence, and to promote a more adequate national program of water research."

The bills all have similar objectives of authorizing appropriations to each of the States to help finance a collegewide or universitywide water resources research institute, center, or equivalent agency. There is further authorized an additional appropriation which the Secretary of the Interior may use to match State or other non-Federal source funds for specific water resources projects. The bills contain certain miscellaneous provisions related to the administration of programs proposed under the bills.

This Department supports the purposes of these bills, as they would stimulate water resources research in colleges and universities, thereby strengthening the overall research in this significant field and at the same time helping to train new scientists and engineers that are much needed for research and teaching in this area.

Agriculture's tremendous responsibility in the effective use of water is evident when we consider some of the data on water use and management. The average annual precipitation for the conterminous United States is 4.75 billion acre-feet. The first impact of this primary water supply is on the surface of the land. The nature of vegetative cover, slope, soil characteristics, cropping patterns, and conservation practices exert the first determination whether precipitation becomes surface runoff, deep percolation, or soil moisture for evapotranspiration. The lion's share of this total water supply—3.38 billion acre feet—presently is used by evapotranspiration from vegetative lands. The remaining 1.37 billion acre-feet constitute the massed water supply available to the Nation. Irrigation agriculture is dependent on this supply and accounts for 90 percent of the water that is consumptively used.

How land in farms and forest, and rangeland not in farms, are managed has a tremendous impact on the potential yield and use of water. In fact, water, soil, and vegetation are so closely related that they cannot be managed separately. Thus, it has been logical and necessary for the U.S. Department of Agriculture to develop programs of soil and water research and watershed management over the past 50 or 60 years. The close association in the U.S. Department of Agriculture between research and action in land and water use is of great importance. Each serves the other. Action programs in the U.S. Department of Agriculture dealing with more than three-fourths of the land area in the United States are principal users and often the first to use research results. They provide practical tests for research and point the way to new investigations. Also, research is often directed to specific management problems.

This partnership of research and management in the U.S. Department of Agriculture has produced an understanding of the close association of soil, water, and vegetation resources. The long background of experience and interest has established in the Department a capability acquired through a long tradition of scientific research. This has enabled it to make the major contribution to progress in the entire field of soil and water conservation research. The Department of Agriculture has a long history of effective cooperative and coordinated

work with the program of the land-grant colleges as established under the Morrill Act of 1862, including cooperative work carried out under the Hatch Act of 1887.

This Department questions whether it is the most effective form of organization to authorize one department participating in water research to exercise a coordinating role in relation to the activities of other departments carried out under existing authority of such departments. This Department would not object to the coordinating provisions of the bills if they are interpreted as covering only the coordination of programs authorized therein, so as to assure that such programs do not duplicate programs otherwise authorized.

This Department believes that the overall coordinating role should be vested in the Executive Office of the President. We would also prefer a bill which authorizes all departments having existing authority in the field of water research to make grants therefor.

The Bureau of the Budget advises that there is no objection to the presentation of this report from the standpoint of the administration's program.

Sincerely yours,

ORVILLE L. FREEMAN, *Secretary.*

COMPTROLLER GENERAL OF THE UNITED STATES,
Washington, May 2, 1963.

HON. WAYNE N. ASPINALL,
Chairman, Committee on Interior and Insular Affairs,
House of Representatives.

DEAR MR. CHAIRMAN: The bill S. 2, passed by the Senate on April 23, 1963, and referred to your committee on April 24, and companion bills H.R. 2683 and H.R. 2689, propose the establishment of water resources institutes at land-grant colleges and State universities and would promote a more adequate national program of water research. There are two matters which we would like to bring to your attention in connection with these bills. Substantial financial assistance would be provided by the Government on a continuing basis under the proposed program yet no provision is made concerning records and audits. As a protection against waste or improper use of Federal funds which go into the program, we suggest that a section be added requiring recipients of assistance to keep records which will enable audits to be made by representatives of the Secretary of the Interior and the General Accounting Office. Similar authority relating to loans and grants is contained in section 25 of the Area Redevelopment Act, approved May 1, 1961, Public Law 87-27, 75 Stat. 63, section 908 of the Housing Act of 1961, approved June 30, 1961, Public Law 87-70, 75 Stat. 191, and in other proposed legislation for grant programs. The following language to accomplish this is suggested for your consideration:

"SEC. —. (a) Each recipient of assistance under section 100 or 200 of this Act shall keep such records as the Secretary of the Interior shall prescribe, including records which fully disclose the amount and the disposition by such recipient of the proceeds of such assistance, the total cost of the project or undertaking in connection with which such assistance is given or used, and the amount and nature of that portion of the cost of the project or undertaking supplied by other sources, and such other records as will facilitate an effective audit.

"(b) The Secretary of the Interior, and the Comptroller General of the United States, or any of their duly authorized representatives, shall have access for the purpose of audit and examination to any books, documents, papers, and records of the recipient that are pertinent to assistance received under section 100 or 200 of this Act."

The second matter which we would like to bring to your attention relates to section 303 of the proposed legislation as introduced. This section, which was deleted from S. 2 by the Senate, would authorize the use of not to exceed 4 percent of any funds appropriated pursuant to the act for purposes of administration. Financing administration by this method is a departure from the usual method of funding administrative expenses, and it is not, in our opinion, conducive to adequate congressional control or to economical administration. It is therefore suggested that if either H.R. 2683 or H.R. 2689 is considered favorably, the first sentence of section 303 be changed in favor of language authorizing annual

appropriations for administration. Such change would insure the benefit of the usual budgetary and appropriation procedures.

Sincerely yours,

JOSEPH CAMPBELL,

Comptroller General of the United States.

Mr. ROGERS. Mr. Morris, a member of this committee and one of the authors of the bills discussed, is unable to be here this morning because he was called out of town. However, he has submitted his statement. Without objection, that statement will be included in the record as if read.

(Mr. Morris' statement follows:)

STATEMENT OF HON. THOMAS G. MORRIS, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF NEW MEXICO

Mr. MORRIS. The purpose of this bill is to promote research, investigations, and experiments in fields related to water, so as to assist in development of new knowledge and techniques which will permit the Nation's needs for water and water related activities to be met in the future in the most economical way.

Demands for water in the United States are increasing more rapidly than the population. Meeting these demands will require a much higher degree of effort henceforth, than in the past. The magnitude of the effort that will be required is so great that it behooves us to develop new techniques for developing, conserving, and utilizing water resources so as to make it possible to meet needs in the most efficient and economical way. The bill proposes to attack this problem through making funds available for research at colleges and universities in all parts of the United States. A corollary purpose which would be achieved through this bill would be to stimulate the education and training of scientists in fields related to water through strengthening graduate schools at colleges and universities by making research funds available.

BACKGROUND

The idea of this bill stems from the report of the Senate Select Committee on National Water Resources, which in January 1961 recommended that the Federal Government should undertake a coordinated scientific research program on all aspects of water use and control as one means of assuring that the Nation's needs for water and water-related activities can be met in the most economical way (S. Rept. No. 29, 87th Cong., Jan. 30, 1961, p. 18). Rather than carrying out this research program by expansion of direct Federal research, with construction of Federal laboratories and attendant increase of Federal expenditures for personnel and equipment, the approach taken by H.R. 2683 is to have the work carried out in the State colleges and universities and other existing institutions of higher learning. This recognizes that all wisdom is not centered in Washington and that problems in the several regions and in the different parts of the country are different and need to be approached from a regional or State viewpoint in many instances.

More recent support for the general approach provided by this bill is given in a report of the Federal Council for Science and Technology,

transmitted to the Congress by the President on February 18, 1963. While the primary information contained in this report is a survey of existing and proposed Federal water research, the report makes it clear that one of the most pressing problems in the whole field of water resources is the development and training of personnel to take care of the expanded water resources job in the future. The report suggests that this can best be stimulated by making Federal grants available to competent universities and other centers of competence in water research fields for research and training. The funds made available for research will make it possible to train a large group of graduate students who will be in a position to move into the positions of responsibility requiring technical knowledge of the water related fields.

DESCRIPTION OF THE BILL

Following a general statement of congressional policy and purpose, the bill has three titles.

Title I would authorize funds for support of State water resources research institutes or centers at a college or university in each State and Puerto Rico, for the purpose of establishing a collegewide or universitywide water resources research institute center or equivalent agency. Additional appropriations are authorized for grants to the water resources research institutes or centers to match on a dollar-for-dollar basis the funds made available by the State or other non-Federal sources for the purpose of paying necessary expenses of water resources research projects which could not otherwise be undertaken.

Title I is patterned after the Hatch Act of 1887 which has proven so effective in establishing and supporting the agricultural experiment stations at the land-grant colleges.

Title II provides an additional amount for grants or contracts for research into any aspects of water problems related to the mission of the Department of the Interior which are deemed desirable and are not otherwise being studied. These grants could be made to educational institutions, private foundations or other institutions or to private firms and individuals, and Government agencies, and not necessarily to the State water resources research institutes or centers of title I.

Title III authorizes the Secretary of the Interior to arrange for regular advice and cooperation of all agencies of the Federal Government concerned with water problems, and of State and local governments and of private institutions and individuals, to assure the coordination of the programs which would be authorized by this bill with established water research programs. Provisions governing the establishment of a Water Resources Service in the Department of the Interior are included, together with other details of administration.

AUTHORIZATION FOR APPROPRIATIONS

The bill would authorize appropriations of \$9,825,000 in the first year, increasing in periodic steps to \$20,100,000 a year in the sixth year after the initial year of operation and thereafter. Additional amounts of matching State or other non-Federal funds would be required to be made available, ranging from \$1 million in the first year

to \$5 million a year in the fifth and subsequent years. The Secretary of the Interior would be authorized to spend up to 4 percent of the funds appropriated for the purpose of administering the programs. This would range from a little less than \$400,000 in the first year of operation to a little more than \$800,000 a year from the sixth year of operation on.

NEED FOR THE BILL

In our complex modern society, research has become the foundation for progress. Expenditures for the facilities we need to conserve, develop, and use water, to maintain and improve its quality, and otherwise to satisfy the myriad use of water are increasing, year by year. Estimates have been made that the cost of all the facilities needed to deal with water in the United States over the next several decades will run to \$10 billion a year. No accurate measure of the amount that is spent annually on research on water is available, but it is likely that it is considerably less than 1 percent of the total cost of facilities, since Federal expenditures, which are a large part of the total, were estimated in the fiscal year 1964 budget message at \$46.7 million in the 1962 and \$66.8 million in the 1963 fiscal year. A further increase, to \$76.8 million, is proposed for fiscal year 1964. These estimates include work classified as surveys, and also funds for pilot plants and demonstration work, so that in all likelihood the actual amounts for research are considerably less.

In contrast to these meager research expenditures, some growing chemical and electronic industrial corporations are spending up to 10 percent of gross receipts on research into new products and improvements of existing products. In a more closely related field, Federal highway legislation calls for a minimum of 1½ percent of all Federal highway funds to be spent on research, and permits an additional one-half percent of the funds for primary, secondary, and urban roads to be so expended.

It seems essential that funds for research in water resources related fields be increased if the intensified water problems brought about by the Nation's growing demands for water and water-related activities are to be met. A section-by-section descriptive analysis of H.R. 2683 follows.

SECTION-BY-SECTION ANALYSIS

The enacting paragraph declares the policy and purpose of Congress to assure an abundance of water, both as to quantity and quality, and to help achieve this objective, to stimulate research, investigations, and experimentation in the field of water and related resources, supplementing present programs, and to encourage the training of scientists in fields related to water through assistance to colleges and universities.

TITLE I. STATE WATER RESOURCES RESEARCH INSTITUTES OR CENTERS

Section 100(a) authorizes payment of a sum, starting at \$75,000 in 1964 and increasing in 2 years to \$100,000 annually, to a land-grant college, State university, or other institution of higher education in each State to establish a water resources research institute, or center, to do competent research, investigations, or experiments, either basic or practical in nature, in the broad field of water and related resources,

having due regard to work being done by others, and avoiding undue displacement of scientists and engineers elsewhere engaged in water resources research.

Section 100(b) authorizes an additional \$1 million appropriation in 1964, increasing \$1 million annually for 4 years to \$5 million in fiscal year 1968 and thereafter, to match, on a dollar-for-dollar basis, funds made available to the State institutes or centers by the States or other non-Federal sources for water research projects that could not otherwise be undertaken.

Section 101 makes provision for payment of the sums to institutions designated by the States, for reports or disbursements, and for recovery of any funds improperly diminished, lost, and misapplied.

Section 102 authorizes use of funds appropriated under the act for printing and disseminating results of research, retirement of employees, administration, purchase and rental of land, and provision of buildings. It also authorizes two or more resources institutes or agencies to plan and conduct research projects cooperatively and authorizes two or more States to designate a single interstate or regional institute or center.

Section 103 extends the mailing privilege of Federal agencies to the official mailings by the research centers or institutes under regulations prescribed by the Postmaster General.

Section 104 charges the Secretary of the Interior with responsibility for the administration of programs under the act, issuance of necessary rules and regulations, and advising and assisting the State water resources research agencies in their work and in coordinating their efforts. He shall indicate research that seems most important, and assist in maintenance of cooperation between the State research centers, and between the State agencies and Federal agencies. The Secretary is directed to determine the eligibility of each State to receive funds under section 100(a) by July 1 each year, and to make an annual report to Congress on the receipts, expenditures, and work of the agencies in all States.

Section 105 provides that nothing in the act shall modify or impair the legal relations between any of the colleges or universities and their State governments and authorizes the State legislatures to direct the division of section 100(a) funds to which the State is entitled between two or more institutions. It provides further that if two or more States designate a single interstate or regional center, the funds to which each State is entitled under section 100(a) shall be paid to the agency designated.

TITLE II. ADDITIONAL WATER RESOURCES RESEARCH PROGRAMS

Section 200 authorizes appropriation of \$5 million to the Secretary of the Interior in 1964, increasing \$1 million a year for 5 years and continuing at \$10 million annually thereafter, for the purpose of making grants, contracts, matching, or other arrangements with educational institutions, private foundations or other institutions, private firms, or individuals, or with local, State, and Federal agencies, to undertake research in water resources problems related to the mission of the Interior Department. The allocation of these funds is not restricted to the centers or institutes established under title I, but the research must be deemed desirable by the Secretary, and must not otherwise be under study.

TITLE III. MISCELLANEOUS PROVISIONS

Section 300 directs the Secretary of the Interior to arrange for the regular advice and cooperation of all agencies of the Federal Government concerned with water problems, and of State and local governments and private institutions and individuals, to assure that work conducted under this bill will not duplicate established water research programs; to stimulate work in otherwise neglected fields; and to contribute to a comprehensive, nationwide program of water and related resources research. The Secretary is directed to disseminate reports and information on activities under the act and to maintain a broad catalog of Federal water resource research projects, and investigations in progress or scheduled, together with such non-Federal projects as are voluntarily reported to him. The President would be authorized to transfer the cataloging function to another agency if a central or general system of cataloging research is established.

Section 301 provides that nothing in the act is to be construed as giving the Secretary of the Interior authority or surveillance over water resources research conducted by any other agency of the Federal Government or as repealing, superseding, or diminishing existing water research authorities or responsibilities of other Federal agencies.

Section 302 authorizes establishment of a Water Resources Service in the Department of the Interior to administer programs authorized in the act.

Section 303 authorizes use of not more than 4 percent of funds appropriated under the act for administration, the employment of a Director of the Water Resources Service at grade 18, and if necessary, to obtain competent personnel, to employ not to exceed 5 employees above civil service grade 15 in addition to the number otherwise authorized by law.

Section 304 authorizes the Secretary of the Interior to make advance payments for the undertaking of water resources research work when such payments are necessary to facilitate such research.

Section 305 provides that within not more than a year after the fifth year of operation under the bill, the Secretary of the Interior shall make a comprehensive review and appraisal of progress and accomplishments under the act and submit it to the President for transmittal to Congress together with his recommendations on revisions of the act with the independent views and recommendations of governing authorities of the State colleges and universities on desirable revisions.

Section 306 authorizes use of the title "Water Resources Research Act."

Mr. ROGERS. We also have a statement from Representative Reifel which without objection will be inserted in the record as if read. There being no objection, it is so ordered.

(Mr. Reifel's statement follows:)

**STATEMENT OF HON. BEN REIFEL, A REPRESENTATIVE IN
CONGRESS FROM THE STATE OF SOUTH DAKOTA**

In South Dakota we have come to realize the important role which water can play in the economic development of an area.

Since our earliest history, water has been the principal factor in the economic growth and continued opportunity for our citizens. Water

truly can be called the lifeblood of South Dakota. In a State such as ours, where agriculture is our chief concern, a dry season can mean disaster for the farmer and it can mean shortages in vital commodities and foodstuffs.

Water, or, more accurately, the lack of water, has been a problem that we have had to face. It has been a problem that we have shared with many other parts of the country. It is a problem that shall continue to plague not only those of us who live in the areas that have traditionally had a water shortage, but also those who now enjoy the benefits of a plentiful supply of water. The problem is one which demands a solution.

I believe that the Water Resources Research Act would be a significant step in initiating a permanent solution to this problem.

The Senate-passed bill, S. 2, will make available funds for research in water development and resources. Each year \$100,000 would be available to every State for water research. An additional \$5 million would be available to research centers on a matching basis for money supplied by the States or other sources, and it would make another \$10 million available each year to be directed by the Secretary of the Interior through arrangement with the States or other qualified organizations for needed water research.

Not only has a short water supply meant uncertain developments in agriculture in a State like South Dakota but also it has meant a curtailment of industrial expansion and business opportunity.

The quantity of water demanded by municipalities and urban areas is staggering. Lack of a supply of water in an urban area will mean the discouragement of business and commercial activities and hamper development of recreational areas.

With an expanding population and the continuing demand for the use of water resources, the Nation may be faced with the problem of a critical water shortage in the future.

It is vitally important for us to act now in establishing a scientific study of water resources and water availability. We must determine new and better methods of water acquisition, conservation and utilization.

A Water Resources Research Act would begin such a study. Passage of this bill will be a step toward continued progress in bringing to an end the serious problem of a water shortage.

I am pleased to add my support to these measures and I hope that the committee will take favorable action.

Mr. ROGERS. Without objection, the following statement from Representative Donald M. Fraser will be inserted in the record as if read. There being no objection, it is so ordered.

STATEMENT OF HON DONALD M. FRASER, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF MINNESOTA

New and expanded research is needed if we are to guard our Nation's water resources and meet the growing demand for water.

In my State, Minnesota, water is plentiful, clean, cool. We proudly call our State the "Land of 10,000 Lakes." But just as every other part of the country is finding problems with water supply, so too Minnesota must plan now to protect its water resources.

New methods must be found and new investment planned for purifying, conserving, reusing, storing, and expanding our water supply. Research cannot be handled by our State alone. We need a national system of water research centers to concentrate effort on this problem.

Minnesota's changing water needs are similar to the rest of the Nation. Use of water in the Minneapolis-St. Paul area leaped from 42 million gallons a day in 1936 to 88 million gallons a day in 1961. New industries demand more water.

Largest industrial ground water users in Minneapolis today are—

1. Milling.
2. Petroleum refining.
3. Malt beverage.
4. Electrical machinery.
5. Fabricated metal products.

Gas manufacturing, railroads, and dairy products industries were the heavy users of water 30 years ago.

Air conditioning is consuming ever greater quantities of water. Expanding population in the metropolitan area puts a strain on existing water sources.

In the next 40 years the water use in the Minneapolis-St. Paul metropolitan area will have to double to supply the needs of our growing economy.

A study by the State of Minnesota Department of Conservation spells out typical problems which need solving if we are to meet the demand for water:

Proposals have been made for returning used air-conditioning water to the aquifer from which it is pumped or to another aquifer. The possibility of contamination, the gradual increase in temperature of the body of ground water, and certain operational difficulties encountered in recharge wells make this of doubtful value on a large scale.

Probably the greatest opportunities for effecting economies in the use of water are in industrial plants, some of which require large quantities of water for cooling, processing, boiler feed water, air conditioning, and sanitation. Each industry or plant presents an individual problem because of wide variations in such water requirements as temperature, purity, and other qualities. In some cases water which has been used once for cooling or condensing could be reused in the same plant for processing or washing; or warm water may be cooled by evaporation in cooling towers and used repeatedly for cooling. Recycling—the use of the same water repeatedly for one purpose—or its use successively for various purposes has been remarkably successful in reducing the water requirements in some industries.

A proposal is now being studied for conducting water after it has been used for air conditioning in downtown Minneapolis through storm sewers to a point from which it can be pumped directly into Minneapolis lakes to aid in maintaining lake levels or to ponding areas from which seepage will aid in recharging ground water.

In Minneapolis we are proud to have the University of Minnesota which has a substantial research and education program in water use. Our university is ready to fulfill the university's role in water resource activities as described at the 1960 Western Resources Conference:

* * * It must conceive, sponsor, and encourage basic research in the natural phenomena upon which water problems are based, and it must educate new generations of competent scientists. It must, if it also offers technological training, assure that competence in these fields keeps pace with progress in basic science. Additionally, the university must produce social scientists, economists, teachers, and administrators capable of holding positions of responsibility

in a changing world, one in which many changes are dictated by water or the lack of it.

S. 2 is intended to encourage expanded research in use of this vital natural resource. Coordination with existing Federal programs, use of college laboratory and teaching facilities, establishment of research centers at land-grant colleges—all of these hold great promise for a water hungry nation and new horizons of hope for regions and industries even now being limited for lack of adequate water supplies. This legislation deserves the support of this session of the 88th Congress.

Mr. ROGERS. Our first witness this morning is the Honorable Olin Teague, of Texas, one of the authors of the measures pending, a man who represents a district in which is located the famous institution known as Texas A. & M. Being a Texas University man myself, that is rather difficult to admit, but it is so.

Mr. Teague, it is nice to have you.

STATEMENT OF HON. OLIN E. TEAGUE, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF TEXAS

Mr. TEAGUE. Thank you, Mr. Chairman. I appreciate the opportunity to be here this morning. I wish the other members of the committee could really understand that statement you made about how difficult it was for you. In fact, there is something I should tell the other members, but I guess I better tell them privately.

Mr. Chairman and members of the committee, I appreciate very much the opportunity to appear before you today in behalf of my bill, H.R. 2689, for the purpose of establishing water research centers at land-grant colleges and State universities and to promote a more adequate national program of water research.

First, Mr. Chairman, H.R. 2689 is intended to meet two national needs; namely, to accelerate research in water problems and to accelerate the training of the increased number of hydroscintists who are needed to deal with fast developing regional and national water problems.

Title I of the bill provides for the establishment of water resources research institutes in each State, preferably at a land-grant institution or a State university or an institution of higher learning designated by the State. It would authorize an appropriation of sufficient funds to give each of these institutes or centers \$75,000 in its first year; \$87,500 in its second year, and \$100,000 a year in the third and succeeding years. Further, it authorizes an appropriation of \$1 million, increasing to \$5 million the fifth year, and thereafter to match on a dollar-for-dollar basis, specific resource research projects to be conducted by these State centers. The bill contains specific provisions for the handling and accounting of funds by the States, limitation of funds uses, and the reports required.

Specific definitions of authorities and responsibility of the Secretary of the Interior to administer the program, make regulations, certify State eligibility, provide guidance, and to receive funds and make reports to Congress are contained in the bill.

It contains safeguards in section 105 of the bill for the purpose of disclaiming Federal interference in relationships between the colleges and universities and their States.

There is an authorization for appropriations of an additional \$5 million, growing to \$10 million over a 5-year period, which the Secretary of the Interior may use to make grants or provide matching funds on desirable water research projects not otherwise being undertaken with colleges and universities.

Provisions are made directing the Secretary of the Interior to obtain advice and cooperation of other Federal agencies, State and local governments, private institutions, and individuals in administering the act.

Coordination of water research work, which is one of the principal desires of this committee, is provided for in section 300 which states that the President may, upon establishment of a central or general system of cataloging current and projected scientific research by the Secretary of the Interior, transfer the research catalog function as he deems desirable. Dr. Jerome Wiesner, Director of the Office of Science and Technology, while testifying on S. 2 in the other body stated that all of the Federal agencies had agreed on a cataloging system of water research projects channeled through the Office of the Secretary of the Interior and coordinated at the White House level.

The balance of the bill provides for the establishment of a Water Resources Service within the Department of the Interior to administer the programs; 4 percent of appropriated funds for administration and the designation of grade 18 on an individual as a Director with five employees in grade 15 and a designation of the title of the act.

This bill embodies the recommendations made by a Select Committee on National Water Resources of the U.S. Senate in their report of January 1961, as well as those of the National Science Foundation, the National Academy of Sciences, National Research Council, and of the Council for Science and Technology. All of these groups agreed that there was a need for the intensification of water resources research and the step-up of training of scientists in the water field.

Thank you, Mr. Chairman. That completes my statement.

Mr. ROGERS. Thank you, Mr. Teague. Mr. Aspinall?

Mr. ASPINALL. Let me say to Chairman Teague that this recalls to my mind several pleasant years I had the privilege of serving on his committee under his direction. I am glad to have him here speaking in behalf of this legislation.

As far as research programs are concerned, Chairman Teague, this is not what you would call a very large program. In its ultimate it would amount, as you suggested, to \$20 million of Federal moneys per year. The end of the program, of course, is indefinite. It is open ended in that respect. I suppose we shall always have problems concerning water before us as long as we are a civilization.

The question I would like to ask you is: When should the Federal Government, as such, spend Federal tax dollars on research programs?

Mr. Teague. Mr. Chairman, that is a very difficult question. I think we should start at the bottom, at the local level, as near the bottom as possible, and where it is a particular program that pertains to the very local level the local level should bear the cost and as much of the work as possible.

When a program gets to be as big as a water research program which, as you say, is going to affect this country from now on—water is, of course, as you well know, our lifeblood—if we do not

have water, we do not have anything. When a program is so national in scope, I think it must to a great degree be directed by the National Government, again bringing in local governments as much as is humanly possible. I think anything as big as this, as national as this, the National Government must direct.

Mr. ASPINALL. If I remember correctly, in fiscal 1964 our budget, combined budgets, calls for an expenditure of approximately \$75 million to be spent in research activities on water. This is including the saline water program, Bureau of Reclamation, Department of Agriculture, and so forth.

With that in mind, do you feel that we can proceed on another research program that ultimately will require about \$20 million unless we enlarge it further?

Mr. TEAGUE. Of course, Mr. Chairman, it must be coordinated. I would assume it would be coordinated or this committee would provide for its coordination. I represent a district that is bounded on the east and west by a river, a river goes down the center. In the 16 years I have been in Congress the whole concept of water, just in that little district, has changed. At the time I came here they were planning a dam of 60,000 acre-feet of conservation storage and 600,000 acre-feet of flood control. It has completely reversed itself to where now there is twice the amount of water for water conservation than flood control. Practically every small community throughout that district is short of water.

Mr. ASPINALL. This could very well be because of the fact that there are other installations above the present reservoir which would take care of some of the flood control damage possibilities.

Mr. TEAGUE. Also in the use of water, the use of water has changed radically.

Going back to your question, of course, these programs should be coordinated, and I am a considerable distance from this program. I do not know the details.

Mr. ASPINALL. This is one of the weaknesses of this bill as it comes before us, that it does not provide for tight coordination, tight control. Seemingly, it just lets the present departments and agencies that are handling such activities go their way, and sets up another separate program. I am glad to have your position that you think these activities should be tightly coordinated.

A great deal of stress and emphasis is laid upon placing a part of this work at least in the colleges. Why do you think that that is necessary or desirable?

Mr. TEAGUE. Mr. Chairman, my statement said either the land-grant colleges or universities, because I think that probably the greatest pool in our country today of scientific manpower that is not being used to the maximum degree is in our universities and colleges. I think that the country would gain much from a greater use of these pools of scientific know-how.

Mr. ASPINALL. Do you see any danger in this legislation, that it would result in just setting up a chair in the various colleges or universities? Of course, the act as presented to us would provide, if desirable, for an agricultural and mechanical college of the State and another university, two in one State.

Mr. TEAGUE. It would require direction and leadership. Take our space program, for example. We have gone to our colleges for engi-

neering and scientific help. Certainly, the work there has not proven that it would be just a chair; they have produced in the jobs they have been given to do.

MR. ASPINALL. In other words, what you are saying is that perhaps the training of scientists alone in this field in these universities might well be worth the cost of the program; is that right?

MR. TEAGUE. Certainly it would be worth a whole lot.

MR. ASPINALL. One other question and I will give way. This program is set up primarily to be operated in the Department of the Interior. As I suggested a minute ago, the other agencies would continue as they now are. Why should the Department of the Interior be given this particular responsibility?

MR. TEAGUE. I do not know that it particularly should, Mr. Chairman. It just seemed to me it was the logical department to handle this type of program.

MR. ASPINALL. You think that since this involves natural resource development, more than likely this would be the department where such activity should be centered?

MR. TEAGUE. Correct.

MR. ASPINALL. That is all.

MR. ROGERS. Mr. Nygaard.

MR. NYGAARD. I have no questions at this time. I will reserve my time.

MR. ROGERS. Mr. Haley.

MR. HALEY. Thank you, Mr. Chairman. I have no questions. I found out a long time ago not to take issue with the chairman of one of my committees if I want to get along very well.

MR. TEAGUE. Mr. Chairman, I wish that were true.

MR. ASPINALL. Would the gentleman yield to me?

MR. HALEY. Yes.

MR. ASPINALL. I wish he would always be so attentive to the wishes of his chairman in this committee.

MR. ROGERS. If the gentleman will yield to me——

MR. HALEY. Yes.

MR. ROGERS. Off the record.

(Discussion off the record.)

MR. ROGERS. Mr. Martin.

MR. MARTIN. Thank you, Mr. Chairman. I am not familiar with the Senate bill. I notice on page 23 of the committee report on this from the Senate that they recommended that the Department of the Interior, the Secretary, should be authorized in the bill to set standards for basic research. Was that done in the Senate?

MR. TEAGUE. I think it was, but I am not sure.

MR. MARTIN. Do you know, Mr. Chairman?

MR. ROGERS. I think counsel can answer that.

MR. MCFARLAND. Mr. Martin, I believe this is a recommendation of several agencies to the present Senate bill as passed, that the language be strengthened to provide the Secretary with authority to set standards with the view of getting high quality research. At the present time, I do not believe there is language in any bill to specifically require that.

MR. MARTIN. That is all; thank you.

MR. ROGERS. Mr. Johnson.

Mr. JOHNSON. Thank you, Mr. Chairman. Our State is very interested in this program, and the University of California has been working toward this end for some time for a research center such as this to be located in Davis at a branch of the University of California. I do think before this hearing is over we will know much more about it and our State will probably take a position. Thank you.

Mr. ROGERS. Mr. Skubitz.

Mr. SKUBITZ. I have no questions.

Mr. ROGERS. Mr. Duncan.

Mr. DUNCAN. Mr. Chairman, I notice in the statement which Mr. Morris submitted that there was a report given to the Senate by the Federal Council for Science and Technology which was, in fact, a survey of existing and proposed Federal water research. Do you know of any report that summarizes the research being done by everyone in the United States at the present time—State governments, private industry, and so on?

Mr. TEAGUE. No, sir; I do not, Mr. Duncan.

Mr. DUNCAN. I notice, too, in this report that we apparently have in the 1963 budget some \$66.8 million devoted to water problems including research. In effect, what your bill would do would be to add immediately another million dollars a year to this and ultimately some \$5 million a year and put those specific sums in the State institutions to do research work, I assume; is that correct?

Mr. TEAGUE. That is correct.

Mr. DUNCAN. This water research would cover all aspects of it—saline conversion, pollution, storage—is this correct?

Mr. TEAGUE. Yes, sir.

Mr. DUNCAN. I keep getting letters, Mr. Chairman, from people in my district saying the Federal Government ought to stay out of the problems of water pollution. Do you agree with these letters? There is apparently some philosophical differentiation as to where the level of research and work ought to be carried out.

Mr. TEAGUE. It goes back to the chairman's first question of where should the Federal Government come into it. Where the pollution problem crosses State lines and affects whole sections of the country, I think the Federal Government has to almost get into it. Where it is a local problem, they should take care of it.

Mr. DUNCAN. Where we are dealing with river systems which transcend State lines—

Mr. TEAGUE. The Federal Government has to play some part in it.

Mr. DUNCAN. I see no other way to handle it, do you?

Mr. TEAGUE. No, sir; I do not.

Mr. DUNCAN. This bill of yours at least makes an effort to put some basic responsibility in the States, does it not?

Mr. TEAGUE. Correct.

Mr. DUNCAN. We have also made some efforts, I think, insofar as the conservation of water is concerned to introduce some coordination and cooperation between the agencies of the Federal Government that are engaged in reclamation projects around the country—the Departments of Interior, Agriculture, Corps of Engineers, Health, Education, and Welfare. Where would this program fit into that? Would you contemplate that that would be a kind of super coordinating agency that would coordinate the coordinators we now have?

Mr. TEAGUE. To a degree that is true; but I would assume that at the White House level it would be simply a matter of bringing the different groups together or saying how much work each group would do. But I would not think that would be any more than directing where the work is to be done. I would hope this would be focused in one agency; namely, the Interior Department.

Mr. DUNCAN. Basically, we are adding additional sums of money, providing for matching grants from the States, and putting responsibility in the States for water resource research with a coordinating agency at the Federal level. Is this basically it?

Mr. TEAGUE. That is correct.

Mr. DUNCAN. That is all; thank you.

Mr. ROGERS. Mr. Gill.

Mr. GILL. Chairman Teague, I wonder if you could comment on a comment by the Bureau of the Budget in relation to S. 2. This again goes back to the coordination problem, but it deals, I believe, only with the coordination of the research to be done under this bill. The comment of the Bureau of the Budget states:

"There is no explicit statement in the bill that the Secretary"—meaning the Secretary of the Interior—"is to review research to insure its adequacy."

Do you have any thoughts in regard to this?

Mr. TEAGUE. Mr. Gill, certainly I would not object to any statement being put in the bill by this committee that would require, that would tie the program down tighter, and require that the Secretary of the Interior review and attempt to see that there is no duplication in the research that is done.

Mr. GILL. Would it not be likely to put the Secretary of the Interior in such a position that he would be overseeing research activities of universities? Sometimes they are touchy about this.

Mr. TEAGUE. To a degree, yes, I think so, but someone would have to do it.

Mr. GILL. There is another question raised in the bill which is whether there would be one or more State agencies receiving money under this legislation. There is some thought that it should be limited to one State agency per State. Do you have any particular thought on that?

Mr. TEAGUE. I think there are some areas that will be a lot more interested in this bill than other areas. You might want to have a combination of States.

Mr. GILL. Certainly a combination of States would be another problem. It is a very good thought. Take your own State, for instance. You mentioned Texas A. & M. I understand Texas is quite a large area of land.

Mr. TEAGUE. We have quite a water problem, too.

Mr. GILL. You must have varying problems in different parts of the State. Would Texas A. & M. be able to alone handle this or should Texas A. & M. be given money and be allowed to subcontract to institutions in other parts of the State?

Mr. TEAGUE. Take the chairman of the subcommittee, for example. He lives 400 or 500 miles from where I do. Their water problems are completely different from the water problems in my particular area.

There has been a lot of work on water done in Texas by the State and in cooperation with the Federal Government. I do not know enough about the situation to say that one school should do it or one university or whether it should be spread out more.

Mr. GILL. Would it not tend to be more orderly if one university had charge of the project but was able to subcontract to areas that needed help?

Mr. TEAGUE. I would certainly think so.

Mr. GILL. Thank you, Mr. Chairman.

Mr. ROGERS. Mr. Teague, in response to that last question, I believe Mr. Gill said one university should have charge of the program.

Mr. TEAGUE. He said if one university had charge, would it not be better coordinated than to have a number of universities in a State.

Mr. ROGERS. You mean on a State basis rather than Federal?

Mr. TEAGUE. On a State basis.

Mr. ROGERS. Thank you very much, Mr. Teague.

Mr. TEAGUE. Thank you, sir.

Mr. ROGERS. Our next witness is the Honorable Billy Matthews, of Florida, a colleague of ours who has a great interest in this problem. Mr. Matthews.

Mr. HALEY. Mr. Chairman.

Mr. ROGERS. Mr. Haley.

Mr. HALEY. May I remark on my distinguished and able colleague before the committee this morning and state that in his congressional district and in his hometown he represents an area that the great University of Florida is located in. I am sure Billy is always interested in educational matters. We are glad to have you.

STATEMENT OF HON. D. R. (BILLY) MATTHEWS, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF FLORIDA

Mr. MATTHEWS. Mr. Chairman and my dear friend from Florida, Mr. Haley, members of the committee, I want to thank you for this privilege and to say that one of my main reasons for coming here today is to thank this committee. You know, many of the columnists throughout the country often ask the question: "Why does it take Congress so long to solve its problems?" There are some critics of the congressional procedure who, I think, would indicate that perhaps at least in their opinion Congress has outlived its usefulness.

Mr. Chairman, one reason that it takes so long for Congress to solve its problems is because of the enormity of the problems. The chairman of this great committee will probably receive as many letters in 1 week on one issue as the great Daniel Webster used to receive in a whole session of Congress. There is no problem, in my opinion, any more important now than this problem of water resources of our Nation.

As my friend and colleague from Florida, Mr. Haley, said, I represent an area in which is located the University of Florida at Gainesville, Fla. The president of that institution, Dr. J. Wayne Reitz, has appeared before the Senate committee, as I understand, in favor of this type of legislation. He has written me about it.

It is my understanding, Mr. Chairman, that the National Association of Land-Grant Colleges has approved this particular type of

legislation without, of course, unanimous approval to the dotting of an "i" and the crossing of a "t."

Some years ago as a member of the House Committee on Agriculture I went to the far western part of this Nation, into the home of the chairman of this great committee. For the first time I realized how important the conservation of snow was. I found that out there their problem was getting the water and holding it, whereas, as my colleague, Mr. Haley, from Florida realizes, our problem in Florida is not to get the water but to hold it once we get it, and to make arrangements for it to find its last resting place without irreparable damage to the topography of Florida.

In Florida our problems are different from the problems in Colorado or Texas or California or any of the great States in the Union. We have at Silver Springs, Fla.—that is not in my congressional district, Mr. Chairman—these springs that have a daily outflow which would just about take care of the water needs of the city of New York.

In the Suwannee River in Florida, most of which is in my district, we have this beautiful stream rising in the Okefenokee Swamp in Georgia, meandering its way in a veritable fairyland of fauna down into the Gulf of Mexico. It is fed by myriad streams, beautiful, soothing, clear streams. That water is wasted.

We have problems with the replenishment of the aquifers in Florida. Quite frequently, although we do not have much rainfall in Florida, our underground streams are replenished because of the peculiar system of replenishing these aquifers. I understand the replenishment comes from as far away as North Carolina.

That leads me to say that I believe the approach to this problem in my bill—it is similar to the one, as I recall, introduced by a distinguished member of this committee, Mr. Morris, and similar to the one introduced by Mr. Teague—may I say, frankly, I purloined the bill, Mr. Chairman, from our dear colleague, Mr. Morris, with his permission.

I think this approach is a good approach. I come from an area that is represented by a great land-grant college. For 10 summers of my life I worked with the extension service of the University of Florida. I feel that title I makes possible the work of this research through a water resources research center, at a land-grant college. As I understand, it is not the purpose of this legislation to dictate to the State agency where the research institute or center should be placed. However, I would be hopeful that in Florida certainly one of these centers would be on the campus of the land-grant college at the University of Florida in Gainesville, which, frankly, is in my home city.

These people in the experiment stations—as you know, these are part of our land-grant college system—these people in these stations have conducted water research. I think they have competence in this field.

I would hope with all my heart that, if this legislation is passed, the program seek the institution and not make the institution seek the program.

My background is in the field of education. For years before coming to Congress I was connected with the University of Florida. One of the problems I think we have had in the awarding of national

defense educational scholarships to graduate schools has been this problem of too often the institution seeking the program rather than the program seeking the institution.

I make no criticism, but I think that certainly has been one of the problems. I would hope that if this type of legislation is enacted, this particular point would be stressed, that we have the program seek the institution rather than the institution seek the program.

One reason again I like this program is that insofar as our land-grant colleges are concerned, it is patterned after the Hatch Act of 1887. It is not a new type of approach, if you please. It is based on an approach that has been proved to be successful. I need not remind my colleagues on this great committee that largely because of the Hatch Act we today in America find ourselves with an agricultural abundance. We find that 1 farmer can produce enough for 27 other people now. I understand the productivity on American farms could be increased 25 percent in 2 years if we wanted to make a tremendous effort toward that end.

I say this to you, Mr. Chairman, so you will know that I am not giving this approach just a casual attitude. I think it is an excellent approach.

I like this approach because it makes it possible for each State to study its own indigenous problems. As I have said before, our problem in Florida is largely one of holding the tremendous rainfall, conserving it for the time we need it, to make possible the escape of extra rainfall without damage to the topography.

May I say several years ago the gentlewoman from Georgia, who is no longer with us, Mrs. Blich, and I went to our colleague, the Honorable Bob Poage from Texas, to talk about the watershed program. I feel that I might count myself as one of the authors of that bill, although I must say for posterity I get no credit for it, I am not complaining.

Our problem in south Georgia and in Florida was and is, one of conserving the water. We feel that the watershed program has been an excellent program in that regard, but it is a different problem from what we would have in other sections of the country.

Mr. Chairman, one problem we have in the establishment of these water resources research institutes is the problem of a lack of trained personnel. In that connection I would like to quote in part from a letter I received from the Honorable Robert O. Vernon, our State geologist from Florida. He said:

Manning of such a program, if these water institutes are created, is a problem I am particularly concerned with. Of the 2,500 scientists who felt that they had some competence in hydrology, 85 percent of these are engaged in current Federal and State programs and only 4 percent are teaching.

Certainly this program on the site of a land-grant college, if it does nothing more than train additional personnel, I think would open great possibilities for that training.

I think it is very important, Mr. Chairman, as the distinguished chairman of this full committee, Mr. Aspinall, has brought out in his usual incisive manner, that we must be careful of duplication, duplication of efforts. One of the great problems we know we have in the vast Federal Government of ours is this duplication of effort.

I would call the attention of the committee to the fact that on page 2 of my bill, H.R. 4048—I am sure the other bills by my colleagues

in the House are similar—on page 2, in lines 3 and 4, this bill directs that this program should supplement present programs.

Then may I point out that on page 3, lines 9 through 16, it is very definitely stated in this bill that due regard must be taken to the water research projects being conducted by agencies of the Federal Government so that there will not be duplication.

May I point out that on page 6, section 104 gives the Secretary of the Interior the responsibility for the administration of this act but provides that he must give full consultation with other Federal agencies.

May I point out that on page 8, title III of the act, section 300, the Secretary of the Interior is supposed—I know that he will if this legislation is passed—is supposed to get the regular advice and the cooperation of all agencies of the Federal Government concerned with water problems. He is directed to get their advice and cooperation.

May I point out that the cataloging of the research projects that is indicated in this bill in my opinion will aid again in avoiding a duplication of effort.

I want to point out again that I am not wedded to the exact wording of this bill. I realize that is one problem this committee will have to look into.

Already this morning we have had mentioned the cost of this program. Let me say that I am hopeful we can keep this cost in hand.

The Library of Congress informed me that water resources research in 1962 fiscal year in our budget is in the amount of \$46.7 million and \$66.8 million will be provided in the budget of fiscal year 1963.

These figures may differ a little bit with other figures that have been pointed out this morning. With that difference in statement, may I point out that we might not have assumed the same predicate. I think we can conclude that \$66 million plus the \$20 million a year that will eventually be spent if this legislation is passed is not too big an investment for the Federal Government to make in a project of this magnitude.

I would say, however, that I would hope in the future, if this type of legislation is passed, I would expect all of us in Congress would naturally make every effort to see that the expense for this program was not too great for the objectives that we envision for it.

I need not point out to this knowledgeable committee that, of course, other Federal agencies of the Government are participating in water research. In reading the report that accompanied the Senate bill, I was interested to note, for example, that the Secretary of Agriculture, Mr. Freeman, pointed out the tremendous amount of water research that has already been going on through our State experiment stations and pointing out his hope that the Secretary of Agriculture would continue to have an important part in this great water research program.

I need not remind this committee that the National Science Foundation has broad authority to give water research contracts, that the Public Health Service, with its water pollution control projects, is interested in this. In fact, as the chairman will recall, some of the other departments of Government have suggested, because of this wide participation on the part of Federal agencies, that perhaps the

coordination of this work should be in the Office of Science and Technology rather than in the Office of the Interior Department.

I have no brief for this particular proposal, although I think it is worthy of the close attention of the committee. I feel that whoever is responsible for the program, that in this type of legislation there are safeguards that I believe will avoid duplication and will permit the continued participation of the other agencies of Government in the appropriate fields.

Mr. Chairman, that is about all of my testimony. I would like, sir, with your permission, the right to file a very brief statement for the record, which points out the need for research in particular on the use of Florida's water resources.

Mr. ROGERS. Without objection, the statement will be included in the record.

(Mr. Matthews' statement follows:)

THE NEED FOR RESEARCH ON THE USE OF FLORIDA'S WATER RESOURCES

Florida is richly endowed with water resources—resources that have enabled a rapidly growing population to expand its residential, commercial, industrial, and recreational facilities and at the same time raise its per capita income to an alltime high. With only a modest investment in research on water and facilities for making them more useful, these same resources are more than ample to sustain the State's current rate of economic growth for decades to come. On the other hand, if the investment is not made now, water shortages will begin to restrict economic activities at an early date, and the cost of developing new sources of water will rise very rapidly.

Before the State's water resources can be effectively managed, the whole problem of retaining as much rainfall as possible in the soil, in the aquifers, and in the lakes and then making it available at the time and place that people can use it must be thoroughly examined. Studies of how to recharge the Floridian aquifer as rapidly as water is being withdrawn from it are urgently needed. Some of this kind of research is now being done in Green Swamp area, but it must be expanded and extended to all other parts of the State as soon as possible. Likewise, there is an urgent need for research on how to store the optimum amount of water in the State's vast natural surface water storage system—its lakes and streams—and to determine what additional water storage and transportation facilities are needed. Some facilities designed to achieve this end are now being constructed by the Central and Southern Florida Flood Control District but much more must be done if the population of the State continues to grow. To date only a very small portion of the research that must be done before the surface and underground water supply of the State can be fully utilized has even been outlined, let alone started, primarily because research funds have not been available.

Along with research on how to make water available at the time and place people can use it, research must be initiated on how to control the destructive floods that so frequently accompany hurricanes during the rainy seasons. Floodwaters can be and in fact have been effectively removed by ditches and canals, but the longrun effects of doing this are often most disastrous. The same facilities that remove floodwaters rapidly also reduce the water table and intensify the effects of droughts just as rapidly. In other words, overdrainage can have a most detrimental effect on citrus, vegetable, and cattle production in many areas in which the amount of water returned to the atmosphere in the form of evaporation and transpiration exceeds the amount received in the form of rain for from 3 to 9 months per year. By developing a means of controlling floods that is complementary rather than conflicting with a sound water management program, the economic potential of the State can be greatly enhanced.

More research is also needed on how to best utilize the large volumes of water that flow through rivers that originate in other States, pass through Florida, and discharge into the ocean and gulf. The Southeastern River Basin Committee is hard at work on this problem, but the implications of its findings and recommendations have not yet been carefully examined and evaluated, largely because of the lack of research funds.

An investment in research in Florida's water resources at the present time is essentially an investment in the State's future economic development. The most desirable environment in which to make such an investment is in Florida's land-grant university, where all phases of engineering, agriculture, forestry, law, medicine, and business, as well as the basic sciences, are being studied at the graduate level, and hence, where the scholars best qualified to do the job are located.

Mr. MATTHEWS. I would like to say I am not an expert in this matter. You know, someone has said that you define an expert in this fashion. The "X" stands for the unknown quantity and the "spurt" is a drip under pressure. I am not an expert.

I am delighted to participate in any questions by the committee.

Mr. ROGERS. I do not know if we can qualify under your definition.

Mr. MATTHEWS. I want to say I did not mean that to apply to this committee.

Mr. ROGERS. I think all members are very familiar with your excellent sense of humor. We appreciate your very able presentation, Mr. Aspinall, do you have questions?

Mr. ASPINALL. I have two questions, Mr. Chairman. The first is the same question I asked of Chairman Teague.

I would like to know from our good friend and talented Member of Congress just what is his idea of the responsibility of the Federal Government to enter into such a research program as water resource studies.

Mr. MATTHEWS. I would say certainly because in our rivers we have the crossing of State lines and we have problems of pollution, that certainly because of that fact it must be a responsibility and a concern of not only one State but of the Federal Government and of the several States. For that reason I think that the Federal Government should participate in the research efforts. It has a responsibility to participate.

I think because also the problem of water is such a critical national problem and cannot be solved by any one State since, as I have indicated in the case of Florida, it is a problem of several States with the replenishment of our aquifers that the Federal Government must be concerned with it.

Sir, your question is to what extent——

Mr. ASPINALL. Private enterprise has some responsibility in this field.

Mr. MATTHEWS. It certainly does, sir. Let me emphasize, Mr. Chairman, that they must continue to exercise responsibility. Let me say, sir, that the States I think must continue to give their major impetus to the program of water resources research. I emphasize that.

I should think the extent of the Federal Government's participation in this field is this program of research in this particular area, and may I emphasize patterned on the Hatch Act for the agricultural research in the Nation.

Mr. ASPINALL. That brings me to my next and last question. You have drawn to our attention some of the values that we have received from the Hatch Act, the operation of the Hatch Act. Have you ever evaluated the research activities of the land-grant colleges? You give to the land-grant colleges credit for this great amount of foodstuffs we have and our ability to be perhaps the leading Nation in agriculture, but there are also some of those values for which we should give

to private enterprise operations and a combination of government and private enterprise; is that not right?

Mr. MATTHEWS. I appreciate the chairman's emphasizing these things that I did not mention. The chairman is absolutely correct. Without the tremendous effort of private enterprise and individuals not connected with the land-grant colleges, this progress could not have been made.

Mr. ASPINALL. That was the exception I took, not to my colleague's reference to it, but to the matter to which he made reference, the fact that they seem to think all agricultural progress we have made could be traceable to the land-grant colleges. I am not willing to go that far.

Mr. MATTHEWS. I must agree with you, Mr. Chairman. In the development of new seeds, for example, these seeds that give us such tremendous added production, so often that is in the hands of private enterprise.

Mr. ASPINALL. Thank you.

Mr. ROGERS. Mr. Nygaard.

Mr. NYGAARD. No questions at this time.

Mr. ROGERS. Mr. Haley.

Mr. HALEY. Mr. Chairman and members of the committee, I again want to say I am happy to have our colleague, Billy Matthews from Florida, here. He made an excellent presentation. He is well aware of my longstanding interest in the conservation of water.

Sometimes on this committee I might say to my colleague that probably some of the members of the committee do not think I have much interest in water because of my stand on various and sundry projects. However, I know that the gentleman is well aware of my longtime interest in the conservation of water.

While in Florida we have had in the past an abundance of water, nevertheless, utilizing it, putting it to the proper use, is something that certainly Florida must do a great deal of research on. Whether that research should be controlled by the Federal Government, as the gentleman well knows, any time you bring anything here to Washington, put it in this bureaucratic atmosphere, it costs you more money in the long run than if you could do it on the State level.

The Federal Government has no money other than what it takes from its citizens. Certainly if these matters could be solved on the local or State level, we would be better off and get more for our tax dollars. I want to thank my colleague for being here this morning.

Mr. MATTHEWS. Thank you so much, Mr. Haley.

Mr. ROGERS. Mr. Skubitz.

Mr. SKUBITZ. I have no questions.

Mr. ROGERS. Mr. Udall.

Mr. UDALL. Mr. Chairman, I want to say to my friend from Florida that he is one of the most persuasive men in this body, and he so overwhelmed me with the logic and the force of his arguments that I am speechless and find myself without any questions.

I think the gentleman could persuade me to repeal the Ten Commandments if he really tried.

Mr. HALEY. You do not need to do that. The Supreme Court has taken care of that.

Mr. UDALL. Thank you.

Mr. ROGERS. Mr. Burton.

Mr. BURTON. I would like to join with the gentleman from Arizona in what he said. Your customary eloquence pleased us all and I compliment you on your fine statement.

Mr. MATTHEWS. Thank you, sir.

Mr. ROGERS. Mr. Gill.

Mr. GILL. I would like to compliment the gentleman on his eloquence but also say that when he got going on the beauties of Florida I could almost feel tremours across the ocean from the Hawaiian Tourist Bureau.

The problem of overseeing the research programs undertaken by the State universities has been raised by the Bureau of the Budget and others. I wonder if you could give me some idea as to how you think this might be done or whether you think it is even advisable.

Mr. MATTHEWS. Mr. Gill, in the State of Florida, if I may point out that State as an example, our institutions of higher learning are under the general supervision of a State board of control. My colleague, Mr. Haley, has a distinguished record in the State legislature and he could add, I know, to this observation.

The State board of control is in turn under the direction of the State board of education, which is composed of the Governor and his cabinet.

In Florida it would be my understanding that the State board of control would be the State agency that would have the supervision of this activity. It would be this board of control that would say what institution or institutions would receive the grants for these research centers.

I would feel, Mr. Gill, that perhaps in every State we might have some similar setup like that. Let me emphasize again in Florida I think that would come under the supervision of the State board of control.

Mr. GILL. I was referring to that, plus the supervision of the Secretary of the Interior. May I repeat the language in the Bureau of the Budget letter in reference to Senate bill 2:

There is no explicit statement in the bill that the Secretary is to review research to assure its adequacy.

That raises a problem of the Federal Government actually checking on the research of the State institution. Perhaps this is advisable from the standpoint of being sure that the research has some practical application in accordance with the purposes set forth in the bill, but it also raises a great problem of interference with the research facilities of a State university.

Do you have any thoughts on that?

Mr. MATTHEWS. Coming from the Deep South, as I do, of course, I do not want the Federal Government telling the States what to do any more than is necessary. But I feel that in the bill I introduced perhaps there ought to be some provision whereby the Secretary of the Interior could at least review the worth of these projects before the money is awarded. It goes back to the thought I had a few minutes ago that I hope the program would seek the institution and the institution not the program. I do not see how the Secretary of the Interior could in a knowledgeable way grant funds unless in advance he had some information as to the projects or type of activities that were to be undertaken.

Mr. GILL. Thank you very much.

Mr. ROGERS. Mr. Westland.

Mr. WESTLAND. Mr. Chairman, I want to welcome my colleague to this committee.

Mr. MATTHEWS. Thank you.

Mr. WESTLAND. I have only one question. Do you have any idea what the University of Florida might be doing in the way of water research now?

Mr. MATTHEWS. At the present time, Mr. Westland, we have, through the State experiment stations, which, as you know, is a part of the land-grant colleges, some research. Of course the State of Florida, as other States, has a State geologist who is doing some research. We have other universities in Florida. The University of Miami, I think perhaps they are doing some excellent work in water research, but I am sorry I cannot pin it down any more than that.

Mr. WESTLAND. I realize how difficult it is to pin down something like that. I doubt I could do it for the University of Washington. But, do you not think it would be incumbent on this committee to find out what various universities and colleges are doing at the present time?

Mr. MATTHEWS. I certainly do.

Mr. WESTLAND. And see whether or not they need Federal assistance? I have never seen one that would not take something from the Federal Government if it was offered to them, but do you not think we should find out ahead of time what is going on now?

Mr. MATTHEWS. I certainly do, Mr. Westland. I would hope, of course, if such a survey is made, that we still could give this little extra impetus to this great problem of the water resources of the Nation.

Mr. WESTLAND. You mentioned the figure of \$66 million annual expenditure now. It would seem to me that would be a very nominal sum considering the many problems of water, which will become greater, but I certainly would like to know what is going on before we jump into this.

Mr. MATTHEWS. I would certainly think that information would be very helpful; yes.

Mr. WESTLAND. Thank you.

Mr. ROGERS. The gentleman from Colorado.

Mr. CHENOWETH. I want to welcome my distinguished colleague and good friend from Florida.

Mr. MATTHEWS. Thank you.

Mr. CHENOWETH. I would like to inquire what called your attention to the need for further water research, and how you became interested in this proposal.

Mr. MATTHEWS. I would like to say, sir, how much I appreciate your welcome, and I believe the gentleman came in just after I made my opening statement.

It came as a result of a visit I made a few years ago to many of the Western States where I noticed the tremendous problem of getting the water and holding it during the snowfall. As a member of the Agriculture Committee I made many trips to that part of the country.

In Florida, with our hurricanes, it is a matter of conserving water for the time we need it and seeking outlets that are not harm-

ful. Florida has a problem of excessive rainfall at times. I think those are some of the reasons I have become interested in it.

Mr. CHENOWETH. You have too much water in Florida and we do not have enough in my area.

Mr. MATTHEWS. Yes, sir.

Mr. CHENOWETH. Do you think a program like this would be helpful to Florida?

Mr. MATTHEWS. I think it would.

Mr. CHENOWETH. Just how would it help solve your water problems?

Mr. MATTHEWS. I do not want to belabor the time of the committee. Again I think just before you came in I pointed out the fact that we need a tremendous amount of knowledge about water that we do not have now largely because every State has a different water problem, and although we are doing excellent water research, as Mr. Westland pointed out, there is still a great need for more, particularly because every State has a different water problem.

Mr. CHENOWETH. Do you feel Florida is definitely interested in this legislation?

Mr. MATTHEWS. Yes. The president of our University of Florida, an institution in my home city, first wrote me about this particular type of legislation. He has appeared before the Senate committee on behalf of this legislation. And, as one who tries to look at the need of this great country of ours in a few years, I feel we must do more in this matter of water research.

Mr. CHENOWETH. I know you have a broad outlook on these water matters and that you are concerned over the interests of the entire Nation. Thank you very much.

Thank you.

Mr. UDALL. Mr. Chairman.

Mr. ROGERS. The gentleman from Arizona.

Mr. UDALL. I wondered if this program would have any effect on the growing of peanuts?

Mr. MATTHEWS. We might get an irrigation project and produce more. But I do not think it would have any direct influence, no.

Mr. HALEY. I might say to my friend the peanut bill became a controversial matter in our State when the distinguished Senator from New York, Mr. Keating, attached a civil rights provision to the bill.

Mr. MATTHEWS. I got to the position I asked my colleagues to vote against my bill.

Mr. ROGERS. Mr. Matthews, you referred to this bill as providing supplementary means for research. Do you mean supplementary to State programs and private enterprise programs or supplementary to the Federal programs?

Mr. MATTHEWS. I am glad the chairman cautioned me about the use of that word. I think the word should be to provide extra efforts, efforts not now being made by either private enterprise or by the State agencies or the Federal Government. I surely do not want any duplication, Mr. Chairman. Thank you for calling that to my attention.

Mr. ROGERS. Mr. Skubitz.

Mr. SKUBITZ. On page 182 of this report, the Departments of Agriculture, Commerce, Defense, HEW, Interior, AEC, NSF, and TVA are all doing water research work. The budget in 1963 provided \$66 million and the 1964 budget totals \$76,419,000.

Looking at the research projects these agencies are conducting, I cannot see a single thing the States can do that the Federal Government is not doing at the present time. I wonder if we shouldn't consolidate those efforts before we start a new program?

Mr. ROGERS. Did the gentleman address that question to me or to Mr. Matthews?

Mr. SKUBITZ. To Mr. Matthews.

Mr. MATTHEWS. These things the gentleman has brought out is an important point. As Mr. Westland said, we surely need that information and I join with the gentleman in believing we should not have a duplication of effort. But I want over and over again to emphasize the tremendous difficulty the States have with this problem. I did not mention for example the salt water intrusion problem we have in Florida. I have a district that has 150 miles on the Atlantic and 100 miles on the Gulf of Mexico and one of our problems is salt water intrusion. In your State it would be different.

Mr. SKUBITZ. I wonder if those problems are not under study today?

Mr. MATTHEWS. I think this cataloging of information is very important, and I do not want any duplication either. I have a feeling we would find there is a tremendous amount of work that needs to be done that is not now being done and that we could afford with this modest expenditure of \$20 million a year.

Mr. HALEY. I just want to say to my colleague from Florida that we now have nine various programs having to do with water research—Agriculture, Commerce, Defense, HEW, Interior, AEC, NSF, TVA, et cetera. If you will take a look at page 182 of the committee print of the other body dated March 25, 1963, you will find all these various programs listed. Frankly, I do not know what else we could put in there in the way of research that is not now under research.

Mr. SKUBITZ. Will the gentleman yield?

I understand there are 26 different groups within the agencies that are carrying on this research work.

Mr. HALEY. Of course, as usual, the Congress for 2 or 3 years gets off on various and sundry programs. For a while we were on medical research and now we are in the process of various other researches and programs. It always worries me that when we start up one of these programs we want to set up another agency that keeps building these things up. It seems to me if we could consolidate the activities of the programs we now have and see what we are really doing, we would see whether this particular program is necessary.

Thank you.

Mr. ROGERS. Mr. Nygaard.

Mr. NYGAARD. You mentioned the Departments presently engaged in research. Would there be any way of learning to what extent these Departments are now working with the universities on this research through contractual agreements?

Mr. MATTHEWS. Mr. Nygaard, I am sure that information could be obtained.

May I say this: One good feature of this bill is, if it is passed, the Department of Interior will have the responsibility for doing that. I think that is one reason why I would favor the passage of this bill

right now. The program, I admit, is diversified, it is in several different agencies, but in the bill which I introduced and in the bills introduced by several of my colleagues, if this bill is passed the Secretary of the Interior would have that responsibility.

Let me say, sir, I certainly think it ought to be done and it could be done.

Mr. NYGAARD. Thank you.

Mr. ASPINALL. If the gentleman will yield, after all, we are not in a position to give authority to the Department of the Interior that supplants the authority given to the other administrative agencies. We must be careful how we draw this bill. These are determinations we have to make and we will not report this bill out overnight. I can assure you of that.

Mr. MATTHEWS. I certainly agree with the gentleman that the bill needs careful study and I am sure this great committee will give it that study.

As I pointed out, some of the witnesses before the Senate suggested the responsibility should be under the Office of Science and Technology. As I said, I have no brief for the fact it should be given to the Office of Science and Technology, but that has been the suggestion made by some witnesses, as the gentleman knows.

Mr. ROGERS. Thank you very much, Mr. Matthews.

Our next witness is Dr. Theodore C. Byerly, Administrator of the Cooperative State Experiment Station Service of the Department of Agriculture.

Dr. Byerly, do you have a prepared statement?

Dr. BYERLY. Sir, I have some notes.

Mr. ROGERS. You may proceed.

STATEMENT OF DR. THEODORE C. BYERLY, ADMINISTRATOR, COOPERATIVE STATE EXPERIMENT STATION SERVICE, DEPARTMENT OF AGRICULTURE

Dr. BYERLY. Mr. Chairman, we wish to thank you for giving us the opportunity to comment on these bills.

The Department of Agriculture supports the purposes of these bills, as they would stimulate water resources research in colleges and universities, thereby strengthening the overall research in this significant field and at the same time helping to train new scientists and engineers that are much needed for research and teaching in this area.

Agriculture's tremendous responsibility in the effective use of water is evident when we consider some of the data on water use and management. The average annual precipitation for the conterminous United States is 4.75 billion acre-feet. The first impact of this primary water supply is on the surface of the land. The nature of vegetative cover, slope, soil characteristics, cropping patterns, and conservation practices exert the first determination whether precipitation becomes surface runoff, deep percolation, or soil moisture for evapotranspiration. The lion's share of this total water supply—3.38 billion acre-feet—presently is used by evapotranspiration from vegetative lands. The remaining 1.37 billion acre-feet constitute the massed water supply available to the Nation. Irrigation agriculture is dependent on this supply and accounts for 90 percent of the water that is consumptively used.

How land in farms and forests, and rangeland not in farms, are managed has a tremendous impact on the potential yield and use of water. In fact, water, soil, and vegetation are so closely related that they cannot be managed separately. Thus, it has been logical and necessary for the U.S. Department of Agriculture to develop programs of soil and water research and watershed management over the past 50 or 60 years. The close association in the U.S. Department of Agriculture between research and action in land and water use is of great importance. Each serves the other. Action programs in the U.S. Department of Agriculture dealing with more than three-fourths of the land area in the United States are principal users and often the first to use research results. They provide practical tests for research and point the way to new investigations.

Within the Department of Agriculture, the Agriculture Research Service, the Forest Service, the Soil Conservation Service, and the Economic Research Service have about \$10 million in their current budgets to support intramural water research with emphasis on research on water in relation to land management, including watershed protection, water yield, efficient use of water in crop, forest, and forage production, and on economic and institutional problems of water use.

The Department of Agriculture has a long history of effective cooperative and coordinated work with the program of the land-grant colleges as established under the Morrill Act of 1862, including cooperative work carried out under the Hatch Act of 1887, after which the bills under consideration are in part patterned.

The Department's cooperation with land grant and other State colleges and experiment stations in water research will be extended under Public Law 87-788, the cooperative Forestry Research Act.

The 53 State agricultural experiment stations currently have in their annual budgets about \$6.4 million to support water research. Of this sum, about \$1.4 million consists of Federal funds appropriated under the Hatch Act, the remainder coming from State and other sources.

Agriculture and forestry have many water-related problems still to be solved. For example, there is a pressing need for more adequate information on the processes involved in the passage of water from the soil into plant roots, through the plant into the air, and on the influence of environmental factors modifying these processes.

Research should be expanded on the economics of water resources development and management including evaluation of costs and benefits of alternate patterns of use for agriculture, forests, recreation, industry, and domestic purposes and for various combinations of such use. Expanded research is also needed on the institutional aspects of water development and use. Clarification of property rights in water and methods of assuring needed and timely participation by all levels of government and by private interests in water resource planning and development are needed.

With respect to specific provisions of the bills, the following comments are offered:

The provision in title I, section 105, for cooperation among the States is a desirable one. Cooperation in such regional research should include Federal agencies with authority for water research.

We strongly support title II, which authorizes grants, contracts, and other arrangements to support research into aspects of water

problems related to the mission of the Department of Interior. Similar authority would be desirable for the Department of Agriculture and other departments having existing authority in the field of water research.

The Department of Agriculture would favor a bill which would place the coordinating function among the several departments conducting water research in the Executive Office of the President.

Thank you.

Mr. ROGERS. Thank you.

The gentleman from Colorado.

Mr. ASPINALL. I notice you have changed the statement you made to the other body considerably. Because of the fact I do not have a copy of the statement you made this morning, some of my questions may be directed to matters you gave to the other body, and others may be directed to matters you have not given at any time.

You discussed the water research program which the Department of Agriculture is carrying on in cooperation with the States at this time. Do you interpret the legislation before this committee as having any effect on your present program or as granting authority that would duplicate any of your present research activities?

Dr. BYERLY. Mr. Aspinall, you will recall, having reviewed the testimony in the Senate, that the chairman, Mr. Anderson, and Mr. Allott, were careful to point out the language of S. 2 which limited the activities here authorized to those specific activities and thus assured there would be no duplication. This was a point of concern to us.

Mr. ASPINALL. In other words, this does supplement present activities?

Dr. BYERLY. This was the construction they made, sir, and I am happy to accept it.

Mr. ASPINALL. Do you think there is enough authority provided in the legislation presently before us so that there will not be any duplication in the future?

Dr. BYERLY. Sir, I believe, consistent with my Senate testimony, the last statement I made this morning was that we would favor a bill placing the coordinating function among the several departments conducting water research in the Executive Office of the President, in the Office of Science and Technology.

Mr. ASPINALL. It has been said that this legislation implements the recommendation of the select committee report, that the Federal Government should undertake a coordinated water research program. Do you think this is the type of program envisioned?

Dr. BYERLY. I feel the provisions of this bill will implement a portion of the select committee report. A complete implementation of the select committee report will require added support of the intramural activities including Interior and additional support to the provisions of the Hatch Act and Public Law 87-788. This bill in itself will not accomplish the full purpose.

Mr. ASPINALL. Do you feel this legislation gives to the Secretary of the Interior authority to coordinate the various activities now being carried on.

Dr. BYERLY. You will recall this was a matter of concern to me in the Senate, and with the construction placed by Senator Anderson and Senator Allott I am willing to believe it will not.

Mr. ASPINALL. Do you think the importance of water research is sufficient in itself to set up a Cabinet position for research activities, or do you think that the program, which you suggested be placed in the Executive Office of the President, as opposed to an executive agency alone, is the proper thing to do?

Dr. BYERLY. The coordinating function can be properly carried on, in my opinion, in the Executive Office of the President, in the Office of Science and Technology. It is my feeling that the work in the President's Office should continue and be expanded.

Mr. ASPINALL. Do you think, after all these years of service you have had, there is any tendency in an agency such as the Office of Science and Technology, to think first of the interests of the taxpayers?

Dr. BYERLY. I have been familiar with the work of that Office for the past 2 years and I can assure you in my opinion they do very closely consider the interests of the taxpayer.

Mr. ASPINALL. That is different than some of our other agencies of Government; is it not?

Dr. BYERLY. Sir, will you forgive me for not commenting?

Mr. ASPINALL. I will forgive you and let the question stand.

With reference to the research to be carried on by colleges and universities, do you expect the results would be made available to the Department of Agriculture?

Dr. BYERLY. Yes.

Mr. ASPINALL. And would that make it unnecessary for the Department of Agriculture to conduct research they are now conducting or intend to conduct in the future?

Dr. BYERLY. I do not believe it is the intent of these bills to replace the agriculturally oriented research now underway and which should be expanded. While the information will be useful and we expect close cooperation and coordination, I do not think it will reduce the obligations of Agriculture on research.

Mr. ASPINALL. What you mean is that the research now being carried on by experimental stations of Agriculture will not be supplanted by the colleges and universities under this bill?

Dr. BYERLY. As far as I am concerned I will do my best to see that is the case.

Mr. ASPINALL. Are you willing to advise there is no duplication possible under the Hatch Act as far as our experimental stations are concerned?

Dr. BYERLY. I cannot give an unequivocal answer to that. We have a program to review project proposals before the money is expended, and in those reviews we ascertain what other work is going on in that area. In my opinion there is a minimal amount of duplication.

Mr. ASPINALL. Has there ever been an independent study made of possible duplication?

Dr. BYERLY. There are studies underway now. A committee of scientists was set up under the chairmanship of Dr. Will Myers to review the entire research program of the Department of Agriculture and its cooperation with the States. I would say extensive studies are in progress with regard to the areas of emphasis, always with duplication in mind.

Mr. ASPINALL. What would you say if I told you the president of one of the land-grant colleges expressed the view that they had re-

searched agriculture so many times they should stop and research what they have researched?

Dr. BYERLY. He is not alone in that view. There are others who hold it. I do not.

Mr. ASPINALL. You do not?

Dr. BYERLY. No, I do not.

Mr. ASPINALL. It appears you are in favor of title II. Does that mean you feel none of the research under this title would be useful to the Department of Agriculture?

Dr. BYERLY. No. This will provide for basic research in water and will be useful to all concerned with water. Certainly it will be of interest to the Department of Agriculture.

Mr. ASPINALL. Do you believe a program of grants to universities would be more effective if carried on by an agency such as the Office of Science and Technology?

Dr. BYERLY. My notion of the Office of Science and Technology is that it is a coordinating agency.

Mr. ASPINALL. Has the Department of Agriculture at the present time any difficulty in getting qualified personnel to carry on water research programs that it is presently conducting or will conduct in the future?

Dr. BYERLY. There is some difficulty in recruitment, and sometimes we have to hire people with basic training and put them with more advanced people for further learning on the job.

Mr. ASPINALL. We would not, then, by initiating this program contemplated by this legislation, increase this difficulty in your Department?

Dr. BYERLY. This is a very modest program. It involves a small expenditure, and I do not believe it would greatly aggravate the present problem.

Mr. ASPINALL. You indicate it is a small program, and in comparison with other programs I suppose it is, but do you know where they got the figure of \$75,000 to be boosted up to \$100,000? Do you know where that came from?

Dr. BYERLY. I am uninformed as to why the figures were chosen. The cost of supporting a scientist in research varies, together with his salary, the necessary operating expenses, and other expenses, from \$25,000 to \$50,000. These amounts are sufficient to support the work of one or more competent professional scientists.

Mr. ASPINALL. Perhaps you have answered indirectly the next question: Do you believe you can secure qualified scientists and technical personnel to carry on the provisions of this legislation and at the same time support the programs now going on?

Dr. BYERLY. I have stated this is a shortage category. I do not believe this legislation would greatly aggravate the problem, and the training provisions may help the situation.

Mr. ASPINALL. Do you think there is sufficient value in this legislation to bring about the training of these necessary scientists?

Dr. BYERLY. Yes; I do.

Mr. ASPINALL. Do you believe that in this program of grants to colleges and universities the Secretary of the Interior should review and establish the quality of research to be made or permit the universities to proceed as they desire?

Dr. BYERLY. In my opinion, the Secretary of the Interior should be responsible for reviewing the quality of proposals and their appropriateness.

Mr. ASPINALL. Should he assign definite research programs to the colleges and universities?

Dr. BYERLY. My opinion is that initiative on the part of the recipient universities should be theirs to develop and propose their programs. These, I think, should be reviewed by the Secretary of the Interior, but the initiative should be in the hands of the recipient institutions.

Mr. ASPINALL. Should he review the programs before they are engaged in by the universities?

Dr. BYERLY. Yes.

Mr. ASPINALL. One more question: This is a question that bothers us so much in authorizing research programs. I doubt very much you have a direct answer, but do you know how much of the moneys presently appropriated for research in your agency of Government goes for research directly and how much goes for administrative activities?

Dr. BYERLY. I could only answer with respect to a very narrow definition of how much is spent for administration directly. The Cooperative State Experiment Station Service spends a little more than 3 percent. But that is not the complete answer. We do not have complete information with respect to all research funds used by all experiment stations.

Mr. ASPINALL. With the experience you have had, what do you think is a legitimate percentage to be spent on administrative activities as compared with direct research activities?

Dr. BYERLY. You have asked me a question, sir, I would prefer not to answer. I would prefer to comment on it, if I may be permitted to do so.

Mr. ASPINALL. This is an area this committee is very much interested in.

Dr. BYERLY. Costs of administration vary very greatly with the research underway. They may vary from 5 percent on one project up to perhaps 50 percent on another project. I think it is important that we do this program and I am very much in favor of keeping administrative costs to a minimum.

Mr. ASPINALL. You will remember in the legislation the Secretary is given a great deal of leeway to spend money for printing purposes, for mailing purposes, and for purposes entirely outside the research activity itself. As you say, sometimes this runs over 50 percent and sometimes it is hard for members of this committee to favor legislation that tends to defeat the purposes of research.

Dr. BYERLY. If I may comment on publication, in my opinion publication of the results of research is a part of the research cost. With respect to the Hatch Act, they are under some strictures as to what the money can be used for. With respect to publicity, I have no comments.

Mr. ASPINALL. You are a very good witness.

Dr. BYERLY. Thank you.

Mr. ROGERS. Mr. Westland.

Mr. WESTLAND. I would like to reiterate the comment of the chairman of the full committee, Mr. Aspinall. You are an excellent witness.

Do I understand the Department of Agriculture presently engages in contracts with some universities in the water research field?

Dr. BYERLY. The contract authority of the Department is pursuant to the Research and Marketing Act of 1946, and I would have to review the record to see whether or not there are in fact contracts in this area. The principal support to experiment stations comes under the Hatch Act. These are not contracts.

Mr. WESTLAND. They are not contracts with the university?

Dr. BYERLY. No, sir.

Mr. WESTLAND. You speak of this intramural research.

Dr. BYERLY. Yes, sir.

Mr. WESTLAND. I thought I understood from your testimony that the Department of Agriculture supported research in quite a few universities at the present time?

Dr. BYERLY. Yes; the Agricultural Research Service, the Forest Service, the Soil Conservation Service, and the Economic Research Service do intramural research with their own people at various locations in the United States. In addition they cooperate with universities and in addition, under the Hatch Act and in the future under Public Law 87-788, there will be cooperation through the support of research through grants. But we do not have, in my opinion, adequate authority for project or program grants provided in title II of these bills.

Mr. WESTLAND. That is what I was getting at. You may not have authority to establish water resources research centers, but you do have authority to support universities in their water research programs?

Dr. BYERLY. We have authority to support those designated under the Hatch Act and those that will be designated under Public Law 87-788 with those specific funds. We have authority through contract and through cooperation to join with universities other than these.

Mr. WESTLAND. Are universities designated in the legislation?

Dr. BYERLY. Yes; by the States.

Mr. WESTLAND. The States will designate the universities?

Dr. BYERLY. Yes.

Mr. WESTLAND. And you might, through the Department of Agriculture, support that program; is that correct?

Dr. BYERLY. Yes; within the limits of the specific statutes.

Mr. WESTLAND. That seems like a pretty good idea, is it not?

Dr. BYERLY. Yes; and that is the idea of these bills and of that we are in support.

Mr. WESTLAND. You have the State designate the university which would conduct the water research program and then have the Federal Government support that program?

Dr. BYERLY. Yes; that is right.

Mr. WESTLAND. It is confusing to me to understand what additional authority you think you need.

Dr. BYERLY. The support that we can now give is limited under the Hatch Act to support to the programs of the State experiment stations. Under the McIntire-Stennis Act this is extended to certain designated forestry schools. We cannot, under our present authority, receive a proposal from any appropriate institution or one of these for support to a specific project by grant other than those provided for by the specific statute.

Mr. WESTLAND. This is sort of an expansion, then, of your present program?

Dr. BYERLY. That is correct.

Mr. WESTLAND. Thank you.

Mr. ROGERS. Mr. Gill

Mr. GILL. I wonder if you would comment on one problem raised in S. 2 that you mentioned in your initial statement, and that is, encouraging the training of scientists in the field relating to water. Is this not the type of program which the universities can do better than any other group, and is there need for training more scientists?

Dr. BYERLY. The answer to both questions is "Yes," sir.

Mr. GILL. Is there any way you can measure the need for training scientific personnel in the field of water?

Dr. BYERLY. In response to Mr. Aspinall's question I said this is a shortage category, it is difficult to recruit, and I did not believe the provisions of this bill would greatly aggravate the situation. The projections depend on the estimates of need and on the estimates of funds available. As far as I can see, there will be increasing need for persons trained in this area.

Mr. GILL. You mean it would not aggravate the situation? Do you mean aggravate or alleviate?

Dr. BYERLY. Aggravate.

Mr. GILL. Since the universities are not training enough people, any additional money for training would help alleviate the situation to some extent?

Dr. BYERLY. Yes.

Mr. GILL. Should this be a key role of the universities or should the key role be to do research?

Dr. BYERLY. In my opinion they go hand in hand, to train people to do research and to go into the research.

Mr. GILL. I would like to clarify one other point made in relation to the question asked by the chairman. You said you thought it was important that there be local initiative in research?

Dr. BYERLY. I do.

Mr. GILL. Is there not also a need for overall guidance and advice rather than relying on the individual universities for projects that may not have application from a practical standpoint?

Dr. BYERLY. Yes.

Mr. GILL. Do you think the provisions of S. 2 are adequate?

Dr. BYERLY. Yes. They are similar to those in the Hatch Act and I believe they are adequate.

Mr. GILL. Thank you.

Mr. ROGERS. Mr. Nygaard.

Mr. NYGAARD. I appreciate the fine testimony you have presented to this committee today.

A short time ago you mentioned that through this legislation you would be given further authority to develop present programs. As I understand, everything here would be under the Secretary of the Interior?

Dr. BYERLY. Either I made a mistake or you misunderstood me. This would give no added authority to the Department of Agriculture so far as I know.

Mr. NYGAARD. But it would permit you to expand your present program?

Dr. BYERLY. No. My response to Mr. Aspinall was in relation to title II, which I said we strongly support and would like similar authority for the Department of Agriculture.

Mr. NYGAARD. Then I misunderstood your answer. As I read this bill I did not see where you were given additional authority. This would permit you to continue as you now are with the exception you would get information obtained from these other activities?

Dr. BYERLY. That is right.

Mr. NYGAARD. If a project is allocated to a certain land-grant college, is it your feeling that any of the direction of the activity of this research would fall in the category of your supervision at all or would it be completely supervised by the Department of the Interior?

Dr. BYERLY. I want to be careful in my reply to that, if I may, and take a minute.

With respect to supervision of projects, it would not fall within our office as far as I know. Under the terms of the act where it provides for a Water Research Institute, the State is to delegate to components of a land-grant college the work, and I assume the experiment station would be eligible to perform research under the director of the experiment station. He is not a Federal employee. There would be a question of the coordination of research but this would be his problem. I would check to make sure he is doing it and how he is doing it, but the problem is his and not mine.

Mr. NYGAARD. The supervision falls within your Department and we would be getting another group at another level. My question was, would this create any complication?

Dr. BYERLY. There would be a responsibility on my part to know what is going on within the experiment station. It would be the responsibility of the director of the experiment station for the coordination of the support from different sources within his experiment station.

Mr. NYGAARD. Thank you.

Mr. ROGERS. Mr. Burton.

Mr. BURTON. I have no questions.

Mr. ROGERS. With relation to the general research program so far as water is concerned, this bill would remove all reins of any kind so far as research is concerned; the only limit would be the appropriation?

Dr. BYERLY. Subject to the provisions that this is not to replace existing authorities and existing programs. This would replace "A" limitation. There is still the limitation of funds with reference to existing programs.

Mr. ROGERS. But your present programs are more or less documented and outlined. This bill is a sort of a general bill which would permit research in almost any field of water or any remotely associated field. For instance, in your statement you refer to the property rights in water. The department authorized to make grants under this bill would have the power, if he agreed with the State, to make a grant to a law school to look into the legal aspects, would he not?

Dr. BYERLY. Yes.

Mr. ROGERS. There is no such authority under the present program, is there?

Dr. BYERLY. Limited authorities, at least.

Mr. ROGERS. On page 5 of the Senate bill, I notice beginning on line 12 after the comma it says:

and for the purchase and rental of land and the construction, acquisition, alteration, or repair of buildings necessary for conducting research.

That is an additional authority, is it not, that would permit a program set up under this bill to be used for building buildings or acquiring lands for water research facilities?

Dr. BYERLY. Yes. This provision does not concern me, sir.

Mr. ROGERS. As I understand, you are in support of this general approach to the problem?

Dr. BYERLY. Yes, sir.

Mr. ROGERS. But you do wish some of it would flow into Agriculture?

Dr. BYERLY. We would like to have an authority similar to that in title II and we would favor a bill in which the coordinating function was placed in the Executive Office of the President.

Mr. ROGERS. And it is your feeling that the way this bill is written it would not be possible for the Secretary of the Interior to delegate to the Department of Agriculture research activities?

Dr. BYERLY. Sir, it had not seemed to me that this is likely to happen.

Mr. ROGERS. Thank you very much.

Are there any other questions?

Thank you very much, Dr. Byerly, for a very good statement.

Dr. BYERLY. Thank you.

Mr. ROGERS. The next witness is Dr. J. Herbert Hollomon, Assistant Secretary of Commerce for Science and Technology.

STATEMENT OF J. HERBERT HOLLOMON, ASSISTANT SECRETARY OF COMMERCE FOR SCIENCE AND TECHNOLOGY

Dr. HOLLOMON. Mr. Chairman, I have a statement I would like to submit for the record and comment on it.

Mr. ROGERS. Without objection your statement will be included in the record, and you may proceed.

(The following statement was submitted for the record:)

Mr. Chairman and members of this committee, I wish to thank you for the privilege of appearing before you to present the views of the Department of Commerce on H.R. 2683, H.R. 2689, H.R. 4048, and S. 2, bills now being considered by this committee.

These bills would authorize annual grants to land-grant colleges or other institutions designated in each State and Puerto Rico, for the financing of water research institutes; additional grants to be made on a matching fund basis in support of water resources research projects at these institutes; and further funds to be used for any aspects of water research related to the mission of the Department of the Interior.

The Department of Commerce is strongly in favor of the objectives of this program. There may have been a time when it was thought that water resources were of significance only to agriculture, but we are now all aware of the great significance of water resources to all aspects of the Nation's economy. This is clearly pointed out in section 100(a) where it is expressly stated that the research contemplated by these bills would include the "economic, legal, social, engineering," and numerous other aspects of water problems. The recognition of the breadth of significance of our water resources is, in our opinion, of major importance and highly laudatory. Our ability to utilize fully our water resources is clearly dependent on the level of effort in water resources

research. Increased water resources research is a necessity for the general economic development of the country.

One of the attributes of the program encompassed by these bills is that the funds expended would in large measure serve a dual purpose. By supporting programs in the Nation's colleges and universities, the funds would be used not only in direct support of research activity, but would have the additional effect of increasing the pool of people trained in the areas of water resources. Scientific and technical manpower is a limited resource, requiring management and careful allocation in much the same way in which do our water resources.

While the Commerce Department thus agrees and supports the basic principles of these bills, we feel that the establishment of 50 or more separate research institutes would be inappropriate for two reasons. First, the problems which give rise to the need for water resources research are of a regional nature, and in many cases adjacent States have similar and interrelated problems which can best be attacked by pooling their individual resources. One possible example of this might be taken to be the region of the Great Lakes. It would certainly be far more effective for the States in this area jointly to attack the problems they all face on all of the lakes rather than, say, for Ohio to study Lake Erie, and Michigan to study Lake Huron, etc., or for each of the States to attempt programs of research involving all the lakes.

Secondly, the establishment of 50 or more separate research institutes would result in an inefficient diffusion of our manpower resources. Before one can expect a research establishment to produce effective research, it must acquire some ill-defined but nevertheless substantial "critical mass" of professional staff. Particularly in view of the interdisciplinary nature of water resources research, this critical mass may be quite large, for competence would be required at each institute in a number of different fields. For example, it is difficult to conceive of a water resources institute being effective without an adequate staff of hydrologists. As of last year, the total membership of the American Geophysical Union's Section on Hydrology was 2,589, many of whom, one can be sure, had primary interests and activities in other branches of geophysics and only a peripheral interest in hydrology. By way of comparison the section on meteorology had an almost identical membership, 2,599. Yet there are fewer than 20 university research groups in the field of meteorology, and not all of these consider themselves to be adequately staffed—and not for lack of support.

Returning to my first point, I should make it clear that the regional nature of the problems does not of itself demand that there be only regional research institutes. Were manpower resources sufficient, it would be quite appropriate to have more than one group attacking independently the same problem. On the other hand, limitations of our manpower resources together with the regional nature of the problems involved, make it far more appropriate for the research to be attacked by a smaller number of larger and more competent groups.

I should like to add that section 104 of the bill could be interpreted as requiring the Secretary of the Interior to assure that the individual research institutes would all have to maintain certain minimum standards, including the "critical mass" of talent that I referred to above. If this is the case, then the limitations of manpower would have the effect of forcing States within a particular region to combine their resources so as to achieve these standards. On the other hand, one could interpret this section of the bill as requiring the Secretary of Interior only to certify that there be a capability or even an intent to acquire a capability to carry out research before an institute or State receives its funds. I would strongly suggest that this point might well be clarified and that the intent of establishing regional water resource institutes to the extent that they can be effectively staffed, be made clear.

Subject to this one suggestion, the Department of Commerce would be in favor of the bill.

Dr. HOLLOMON. My name is J. Herbert Hollomon. I am Assistant Secretary of Commerce for Science and Technology. I would like to comment briefly and informally on the statement I have submitted for the record.

The Department of Commerce is strongly in favor of the objectives of the program described in the bill under consideration.

From time to time it has been thought water resources were of significance only to agriculture. I would like to point out they are

very significant to the Nation's industrial development as well and are becoming more so. Also, the research contemplated by the bills under consideration would include economic, legal, social, engineering, and numerous other aspects of water problems.

One of the primary purposes of this bill is to support research as well as to help provide an adequate supply of technical people to deal with the problem.

While we agree with and support the basic principles of these bills, we feel that the establishment of 50 or more separate research institutes would be inappropriate. For example, it is possible that various States could combine and attack regional problems where there are water resources problems common to the whole region. This is particularly pertinent because of the shortage of qualified technical people and because of the fact that in the earlier stages there may not be sufficient competent people to adequately staff 50 or more separate research institutes.

I think it is well to indicate that in order to support technical activities, particularly those that involve not only science and physical fields but economics, that there is a necessity for a critical mass of professional people to be engaged in the technical work. It is not enough to have one or two. There must be teamwork, and therefore it is essential that the institution in question have the ability to attack such problems.

I would like to add that in section 104 of the proposed bill, there is some question to us as to interpretation, as to whether it is proposed that the Secretary of the Interior would determine in advance that the institution had the capability of doing this technical work or whether it had the capability in prospect of doing the technical work. We feel that this point should be clarified and that the intent of establishing regional water resource institutes to the extent that they can be effectively staffed be made clear.

We agree with the Department of Agriculture that the coordination and critical review of the overall national water resources problem should probably best reside in the Office of Science and Technology through the Federal Council on Science and Technology and that it is important, if we are to have a water resources research program of this broad type, that there be insured a means of providing cooperation and coordination between the work of Commerce, HEW, Interior, and those people interested in insuring an adequate research program.

Personally I should like to emphasize that the reuse problem of water, reuse and purification of present supplies of water, is as important as having and holding adequate water resources.

With these comments, the Department of Commerce is generally in accord with the purposes of the intended legislation. We have some question relative to interpretation and also as to coordination.

Thank you.

Mr. ROGERS. Thank you, Dr. Hollomon.

You have heard some of the testimony here this morning and of course some attention has been paid to whether or not this is intended to serve a supplementary purpose, that is, supplementary to present programs.

Is it your feeling that this is what is intended by the bill and is what the bill does?

Dr. HOLLOMON. It is my feeling, within the context of the statements made in the other body and the statements I have heard this morning in previous testimony, that that is in fact the purpose of the proposed bill.

Mr. ROGERS. Doctor, do you feel that this bill creates a situation where the Secretary of Interior could have the power or the authority to coordinate existing research programs that are being presently pursued by the other departments?

Dr. HOLLOMON. It seems to me this question is not entirely clear in title III of the proposed bill and that the question of the relative responsibility, say, of the Office of Science and Technology and of the Secretary of Interior, is not made sufficiently clear.

Mr. ROGERS. Do you feel the best interests of the country would be served if the power or control were under the Department of the Interior or under an agency centered at the White House?

Dr. HOLLOMON. I have a little hesitancy about the words "power" and "control." I would like to suggest that it seems to me very important to separate the coordinating and overseeing functions from the function of operation of a program, and from that point of view I think it would be wise if the coordination was done by an agency that did not have operating functions, and, conversely, that the operation was not undertaken by the coordinating agency. For that reason I would not place the program in the Office of Science and Technology for operation, and I think it might be well to continue the coordination in the Federal Council with respect to water resources.

Mr. ROGERS. Thank you. Mr. Gill.

Mr. GILL. I have no questions.

Mr. ROGERS. Mr. Nygaard.

Mr. NYGAARD. I have one question. In following your testimony, am I to understand that it is your feeling that if it were placed under the Office of Science and Technology, for instance, that there would be a greater possibility for the program assisting present programs and not necessarily establishing entirely new research divisions as they would be set up under the new program?

Dr. HOLLOMON. No, sir. I believe my comment was to the point that in order to obtain coordination of existing programs, to prevent duplication of this and other existing programs, and in order to obtain an inventory of ongoing technical work, that could best be done in the Office of Science and Technology. As to whether or not these funds would be specifically used to augment the mission and activities of other agencies relative to water resources, I made no comment. I do not think that question is at all clear, either.

Mr. NYGAARD. I was wondering if it would be advisable that this program would enhance some of the present developments that are going on in water research rather than to specifically set up, as you indicated, 50 new programs of research.

Dr. HOLLOMON. It seems to me that it is clear that there is need for greater emphasis on water resources research and development in the country and the need for new institutions. Clearly, there will be in the future need for newly qualified, additionally trained technical people.

At the beginning of such activities, however, one would hope to call upon existing competence and to grow the new competence as

the technically trained people are available. It was to that point that I tried to emphasize the need to insure the regional character of these institutions where possible.

Mr. NYGAARD. This was the feeling that I had generally, too, that we could possibly do more with the amount of money expended here if we added it to the approved programs that are presently in existence. Thank you.

Mr. ROGERS. Let the Chair make this observation. Under the rules we are subject to adjournment at the present time.

In the morning we expect to have the Honorable Stewart L. Udall, Secretary of the Interior, and also Dr. Jerome Wiesner, Director of the Office of Science and Technology. As soon as those are concluded, we hope to hear at that time Dr. Wendell E. Johnson, Chief, Engineering Division, Corps of Engineers, Department of the Army, and Mr. James Quigley, Assistant Secretary, Department of Health, Education, and Welfare.

Are there others that have asked to be heard, Mr. McFarland?

Mr. MCFARLAND. There are others, but these are the only ones to be heard at the present time.

Mr. ROGERS. We will then hear the witnesses named in the morning and try to resume the hearings as soon after that as possible. The subcommittee stands adjourned until 9:45 in the morning.

(Whereupon, at 11:50 a.m., the subcommittee recessed, to reconvene at 9:45 a.m., Tuesday, June 25, 1963.)

WATER RESOURCES RESEARCH CENTERS

TUESDAY, JUNE 25, 1963

HOUSE OF REPRESENTATIVES,
IRRIGATION AND RECLAMATION SUBCOMMITTEE
OF THE COMMITTEE ON INTERIOR AND INSULAR AFFAIRS,
Washington, D.C.

The subcommittee met at 10 a.m., pursuant to recess, in the committee room, Longworth House Office Building, Hon. Walter Rogers (chairman of the subcommittee) presiding.

Mr. ROGERS. The Subcommittee on Irrigation and Reclamation will come to order for the further consideration of H.R. 2683 and S. 2.

We are honored this morning to have as the first witness the Honorable Stewart L. Udall, Secretary of the Interior.

Mr. Secretary, it is always a pleasure to have you back with the committee.

You may take the witness stand and bring such staff members as you desire to sit with you.

STATEMENT OF HON. STEWART L. UDALL, SECRETARY OF THE INTERIOR, DEPARTMENT OF THE INTERIOR, ACCOMPANIED BY MR. E. D. EATON OF THE DEPARTMENT OF THE INTERIOR

Secretary UDALL. Thank you very much, Mr. Chairman.

I should like to have my prepared statement, which I assume the committee has, appear in the record in full, and I will try to summarize some of the highlights for the committee, if that is satisfactory.

Mr. ROGERS. Without objection, your statement will be included in the record, and you may proceed to summarize it as you please.

(Statement referred to follows:)

Mr. Chairman, the water resources research authorization being considered by your committee today is an important step forward in solving water problems. It will implement a key recommendation of the report of the Federal Council for Science and Technology which was transmitted to the Congress by the President on February 18, 1963.

The grave facts of our water situation are acutely evident. In major areas of the Nation water supply deficiencies jeopardize economic growth and wholesome living conditions. This is a threat right now in much of the West, it is only one or two decades away in some of the Middle Western States, and for many localities even in the humid areas of water quality and water quantity problems are increasingly serious.

Authoritative studies demonstrate that the yearly rainfall that maintains the Nation's streamflow, lake levels, and groundwater resources, is more than enough to meet all requirements for population and economic growth well into the next century.

But those studies also show that there are complex and difficult problems of water resources development and conservation to even out the annual and

seasonal variations in runoff, to equate geographic differences in the location of water or currents and water use, and to choose among competing uses for municipal, agricultural, and industrial developments.

Among the most difficult problems are how to meet the growing water requirements of recreation and wildlife, and how to deal with the waterborne wastes from chemical, paper, mineral, and other industries, and yet save the healthful and beautiful waterways with which this Nation is endowed.

Planning, foresight, and research are the essence of sound action where our water resources are concerned.

As a basis for effective planning and action, outstanding scientific and engineering authorities express the view—a view which I share—that action to strengthen water resources research is among the most important and productive actions that can be taken at this time.

This is true because the impact of water shortage on economic development, human welfare, and national security can be so drastic, and water requirements are growing greatly and rapidly in relation to the fixed amount of the water supply.

For this reason we must rapidly increase our knowledge of how to conserve water resources and increase our ability to use them fully and wisely. The proposed Water Resources Research Act being now considered by this committee, is a major advance toward that objective.

This administration vigorously supports the water research work of the Federal agencies. Eight major Federal agencies are engaged in this, and their staffs include some of the most highly competent scientists and engineers in their professions. In 1963, funds for water resources research are 40 percent more than the preceding year, and the President's budget for fiscal year 1964 provides a further increase.

In my own Department of the Interior, water research is carried on by the Office of Saline Water, the Geological Survey, the Bureau of Mines, the Fish and Wildlife Service, the Bureau of Reclamation, and others as well. Our program has grown from a 1962 level of \$17½ to \$35 million requested in the 1964 budget.

But encouraging as is the research progress of the Federal agencies, it alone cannot be expected to meet our needs in time. There are also some obvious research gaps in the current program and there is a deficiency of creative talent directed toward our water resources research problems. We need to expand water research so as to be able to match water uses with the supply available, and the timetable makes this urgent. By 1980, water supply will limit further growth and development in major portions of the Nation.

Let me remind you that expenditures on water facilities in the United States are now more than \$10 billion per year but we know that this will have to be multiplied very substantially to meet rising water requirements. In the multi-billion-dollar water expenditures, research is only less than 1 percent of the total.

No progressive industry can remain healthy with such inadequate attention to research. Let me cite a few figures from industry for comparison.

The oil and gas industry annually spends on research and development the equivalent of about 3 percent of its sales revenue, and in the chemical industry the figure is about 6 percent. In 1959, the latest year for which I have data, research and development expenditures by industry amounted to \$9½ billion. For example, the electrical and communications industries spent \$2¼ billion on R. & D. The automotive industry R. & D. expenditures of \$866 million equaled over 12½ percent of the investment in production plant, property, and equipment.

By way of comparison, the value of water resources plant, property, and equipment may be estimated to be somewhere between \$10 and \$30 billion, or more. If only 3 percent of that plant value were available for water resources research, it would be at least \$300 million a year. For fiscal year 1964, the Federal water resource research program amounts to about \$76 million including \$9½ million for research and training facilities.

The Federal Government, the States, and local governments need vigorous research programs to maintain the efficiency of their operations in the water resources field. Doubling or tripling of water research is certainly necessary.

Now, how should we go about doing this?

For one thing, research by Federal agencies must be greatly strengthened because it is the principal source of competence in water problems that are national in scope. Additionally many recognized experts in the water field advise that there are other areas that need more research effort. They also point out,

however, that the shortage of competent research scientists and engineers now is a major limitation on our ability to get the knowledge needed.

A clear-cut answer to this is to enlist the research resources of the universities. They are an important reservoir of technical competence that has been only partially utilized for water resources research purposes. The experience has shown that the universities can take an objective approach to this problem and can marshal creative talents from many sciences and academic disciplines to fashion fresh approaches that will hopefully bring some breakthroughs.

The bills to accomplish this implement the recommendations of the Select Committee on National Water Resources, the report of the National Academy of Sciences-National Research Council, the findings of the Federal Council on Science and Technology and many distinguished scientists and engineers including the President's science adviser, Dr. Jerome B. Wiesner. Its principles are endorsed by the Association of State Universities and Land-Grant Colleges, by a number of professional societies, and by associations in the reclamation and soil and water conservation fields.

Legislation to assist water resources research at universities will have two beneficial results. It will enlist the scientific and engineering competence of university research in water resources problem-solving, and it will also result in augmenting the critically inadequate numbers of scientists and engineers trained in the sciences related to water resources.

The proposed legislation will build on and utilize the established facilities of the State colleges and universities, thereby taking advantage of a system of educational institutions that for over a century has demonstrated its effectiveness in advancing and disseminating knowledge widely throughout the Nation. Concurrently, the proposed legislation would enable State universities to strengthen their participation in the sciences of natural resources management. These are persuasive reasons for establishment of broadly based water resources research centers at State universities.

The universities' readiness to accept the obligations and opportunities of participation in water research activities has been stated by the Association of State Universities and Land-Grant Colleges. Because university representatives are scheduled to testify, I defer to them as spokesmen for the academic world. I want to say, however, that from the point of view of the Department of the Interior, we greatly welcome and look forward to full involvement of universities in this critically important field of water resources research.

Another special benefit that will result from water resources research centers at State universities will be their increased ability to provide informed professional assistance to State and local officials and others concerned in State, local, and regional water resources problems.

As water resources activities move ahead, State and local governments and nongovernmental interests will take an increasingly active part in them. That participation needs expert professional assistance that is informed on local conditions and local problems. The water resources research centers at the State universities can provide that needed professional assistance.

The bills being considered by the committee provide that, in addition to the land-grant colleges and State universities, other universities and research institutions may also be aided in water resources research. Title II of the bill makes it possible to enlist research competence wherever it exists—at any university or college, and also at nonacademic research institutions.

These provisions will encourage and strengthen competence at a number of locations throughout the United States. High caliber professional activity in water resource matters should exist widely throughout the United States so that it is readily accessible to people everywhere as they may need it.

Mr. Chairman, I turn now to the matter of coordinating this research program so as to avoid duplication—a matter with which this committee is very properly concerned.

First, let me say that I too am much concerned that there should not be wasteful duplication of research effort. That would be expensive in dollars, and, of equal concern, it would be wasteful of our extremely limited resources of qualified research personnel.

I have taken steps to evaluate and coordinate current water resources research in the Department of the Interior so as to eliminate unproductive expenditures of money and manpower. Concurrently, we are having discussions with other Federal agencies for the same purpose. We are encouraged by the indications of very promising results from these efforts.

The Federal Council report to the President is an excellent starting point for what will need to be a continuing operation in coordinating water resources research. In the preparation of that report, very real progress was made in bringing together representatives of all the Federal agencies concerned in water resources research. That task force operation laid a good foundation on which we can continue to build for effective evaluation and coordination.

I should comment here, Mr. Chairman, in this connection, that competent experts have expressed to me a reassuring judgment. The material on Federal water resources research brought together for the Federal Council on Science and Technology study, they advise me, appears to show relatively little duplication. I am advised, however, that far more serious than duplication, the study revealed certain very important gaps which no agency's present research program is designed to fill by providing the needed information.

One of the principal objectives in administration of this program will be to provide the evaluation and coordination of research projects proposals so as to avoid duplication. I shall give this objective high priority, and the proposed legislation includes excellent provisions to implement this.

The bills recognize that in order to avoid unproductive duplication of research, assistance to universities will have to take account of the investigations being carried on or programed by the various Federal and non-Federal agencies. Provision for this is made in section 300. The information on research activities thus assembled will, of course, be extremely useful to many people in the water resources field. For that reason, the bill wisely provides that such information shall be available for general use.

At this point, I want to mention the overall coordination of research in the executive branch. Recognizing that Federal research has now grown to the \$15 billion per year level, President Kennedy established the Office of Science and Technology to give the needed scientific leadership. Its director, Dr. Jerome B. Wiesner, will, I believe, inform you on the scope and character of Office of Science and Technology operations.

The Department of the Interior looks to the Director of the Office of Science and Technology as the representative of the President for overall coordination of water resources research as one of the more important items of Federal research activity. The Interior Department should be helpful to the Office of Science and Technology in its overall coordination.

I am fully in accord with the provisions of section 301 that clarify Interior Department relationships in water resources research. This section make abundantly clear that the purpose of the legislation is to increase the amount of water resources research and not in any degree to take over or to curtail the activities of any agency, Federal or non-Federal. My principal comment is that so much water research is urgently needed that there is much more than enough for everyone to do.

Now just a word or two on our preliminary views on the mechanics of the program. First, it seems to me important to bear in mind that the purpose of the program is to enlist the research abilities of the universities to broaden national competence in water resources research and stimulate the development of water resources manpower.

Second, we should bear in mind that by creating centers in all the States, we provide the framework from which focal centers of excellence on water resources can build. To provide for the most efficient location of these institutes where the embryonic interest and capabilities exist, the States must themselves undertake to evaluate their situation and to assess whether the maximum efficiency can be achieved through a center of its own or through a regional center in combination with several other States. We will look to the local people to provide us with the information that will permit these determinations to be efficiently made.

In order to tap the abilities and to enlist the interest of the university people, they should have a lot of initiative in proposing what research projects they undertake. Such projects would be initiated forward by the universities as proposals for Federal assistance. Of course, in many cases, research proposals will come about because State or local officials or others request the university people for information or advice which will show that there is need for research on the subject.

Through the continuing leadership of the President's Office of Science and Technology in establishing policies for interdepartmental coordination and research evaluation, my Department will undertake its cooperative activities so as

to insure the avoidance of duplication or other unproductive expenditures of money or technical manpower in the total national program for water resources research. This is something for which we will have a specific mechanism in accordance with the provisions of these bills.

As a basis for decision on whether to award a grant or contract, I expect to rely to a considerable extent on consultants who should be the best men in each of the scientific and engineering fields involved. These technical experts would be qualified to advise on the technical merit of research proposals.

Furthermore, the program would need to be considered both as to its overall technical adequacy and also as to the broad public interest. For this purpose there would be need for advice that would evaluate and recommend on the overall progress and direction of the program. It seems to me that this kind of consultation is essential for the Secretary of the Interior, and in addition I believe that it should be helpful to the universities as well.

This is in accord with section 104 of the bill under which the Secretary of the Interior would have responsibilities to advise with the universities relative to their water research activities. I am confident that this function can be mutually beneficial both to the universities and to the Government, and that it will establish a helpful relationship.

Naturally, there is concern about what is done with Federal funds that may be granted to non-Federal organizations. I feel that these bills provide for fiscal responsibility and accountability so that reasonably simple procedures will give the needed protection in this regard.

As a final word, Mr. Chairman, permit me to restate my firm conviction that this measure, the proposed Water Resources Research Act, is a great step forward.

Thank you for the opportunity to present my views. If you or others of the committee have questions, I will gladly try to answer them.

Secretary UDALL. Mr. Chairman, looking about the resource picture as we see it in our Department, with all of our immediate and varied responsibilities, I think there is no area that ought to evoke more concern of people who are trying to plan for the future, and I do not think there is any subcommittee of this committee that has to focus its attention on the future more, or does a better job of doing it, than this subcommittee, in terms of water resources. Not only are the projects which this committee considers and authorizes projects that encompass usually a period of 50 years, but I think most of the members of this committee are well aware of the importance to the future of proper water planning.

If there is any resource that we took for granted and misused in the last century, it seems to me it was the forests, and if there is any resource, I think, that we are in danger of taking for granted today, and of abusing and misusing, it is our water resource.

We are already confronted, in many parts of our country, with water problems that are very serious. The real beginning of any water program is with regard to understanding this resource, and this relates, of course, to science and to research.

Although my own Department has the oldest scientific organization in the Government, the Geological Survey, and although they have the finest hydrologists and water specialists in the country today, it is very apparent to all of us, and has been for some time, that in terms of our scientific potential, this is an area where we are headed for trouble unless we do a much better job, unless we get the States in action in a more aggressive way, in this field.

Presently—and I could cite specific instances to the committee—we tend to, with our limited personnel, sort of operate on a fire alarm basis. When a serious water problem develops in some stretch of a particular river or community, we then center on the problem and see what can be done about it.

We may be able to get by on this at the present time, but when we look on ahead, as this committee is accustomed to doing, 10 and 20 and 50 years, I think it is obvious we are going to have to make a much greater effort in terms of science and engineering.

There is in my statement, here, an indication of the amount of research appropriations that have been spent. I think this is quite significant; the amount spent in water development, providing water for the irrigation and such needs of this country, is one of the big businesses in this country. And yet the amount being spent overall for water research is less than 1 percent of the total.

The oil and gas industry, which is a very aggressive and forward-looking industry, spends about 3 percent. The chemical industry, one of the successful industries, spends about 6 percent. And the electrical and communications industries and others also invest very heavily in research.

It does seem to us—and this is borne out by the study that was recently made by a committee of scientists within the administration, and I think it has been borne out in every study the Congress has made in recent years of our water needs—we are short of personnel.

Of course one of the dangers with the competition of other scientific fields is that unless we take steps to encourage the States to act, unless we are able to get new people interested and active and studying in the field of hydrology and other water sciences, in the area of an overall understanding of the nature of this resource, we will end up somewhere on down the line even more short than we are today in terms of personnel, and in terms of our ability to deal with the water problems that we have.

Therefore this legislation is proposed, which has already been passed by the other body. I think it is well conceived in that it is primarily directed toward what I would call a Federal-State partnership, activating the States and getting them into the field in terms of water resources research.

One of the very fine and, I think, one of the finest examples of research, of the use of science as a tool to improve the management of our resources, has been, over the period of years, the land-grant college program at agricultural experiment stations that has strengthened the programs of the Department of Agriculture.

My science people all tell me that the agricultural work at the land-grant colleges, more than anything else explains this great productivity of American farms. In fact, we are so prosperous in terms of farm products that we consider it sort of an extra burden we have to carry, and yet there isn't another country in the world that would not be very happy to have the situation we are confronted with.

But this country invested very heavily for a long period of years, worked with the States, in the agricultural experiment station programs, in agricultural research, and we are now reaping the benefits of it.

Title I of the bill would get the States into the field, so that each of our States could establish and build—some of them are, already, the wiser ones—water research centers. This is a very important and vital step.

The other provisions of the bill, which would give us authority to help support broader research programs than just the quite limited

start under title I—the contracts and grants to land-grant colleges and other institutions is also well conceived.

Let me discuss, through, one other final aspect of this legislation that I know this committee is quite properly concerned with. That relates to the whole problem of coordination of all of our water research activities.

Of course, we have in the Department of the Interior, as the members of this committee well know, many different bureaus that have functions and responsibilities that touch water—the Bureau of Reclamation, the Geological Survey, of course, having very basic responsibilities, the Fish and Wildlife Service, the saline water program, and others.

Most of the natural resource programs and responsibilities in our Department touch water in some way or another, the Bureau of Commercial Fisheries, the Bureau of Mines, and so on, because water is of course a very basic resource.

And it is not only now a problem of coordinating the activities within a department. We would like to think we can do this fairly well. But there are other departments that also have responsibilities—the water pollution program in HEW, the Agriculture Department, of course, with its growing and important interest in water research.

I think one of the significant steps that has been taken in Washington in the last 4 or 5 years was bringing a science adviser into the picture at the White House, on the President's staff.

One of the things I have done that has helped most in my own Department in the last few years is to have a science adviser of my own, because coordinating scientific work, seeing to it that we get the maximum return for our dollar invested in research, seeing to it that overlaps are eliminated and reduced, is very important.

The Office of Science and Technology, headed by Dr. Wiesner, is the proper focus in a scientific program for coordinating the efforts of the different departments. And I think that this is a very important function. I think the committee, quite rightly, will want to give attention to it.

So these are Mr. Chairman, the main arguments that I see for legislation of this kind. I think that this is prudent legislation. I think it is legislation that looks on ahead, so that we are not going to end up on only a fire-alarm basis, and unable to deal with the different water problems we have in this country.

Some of us think, or used to think, that we have water crisis problems merely in those parts of our country that are most dry and have the least rainfall.

Well, there are different types of water problems everywhere in the United States today. Some of them relate to quality, and others relate to sufficiency of water and other problems. But there is not a State in the Union that does not have today some serious water problem, and it is very important that we get the States more active in this field and get a bigger overall effort. And this is the reason for this legislation.

I thank you very much, Mr. Chairman.

Mr. ROGERS. Mr. Secretary, do you feel that the approach through the colleges and land-grant colleges is the best door to enter into the State areas so far as research is concerned?

Secretary UDALL. I strongly feel that this is the best approach. I cannot conceive of any where we have had better experience over a long period of years with research in a Federal-State partnership than that in which we have in the agricultural field now. We have it in some other areas in a less systematic way.

But I think the response that we have had from the universities around the country, the State universities, has been very favorable and indicates that a lot of them are either ready to go, or, if they are already in action, they are very much aware of the importance of enlarging their activities.

Mr. ROGERS. Mr. Aspinall?

Mr. ASPINALL. Mr. Secretary, under this proposal, would there be any favoritism shown between land-grant colleges and State universities, or are they to be considered together?

Your reference, here, to the Hatch Act goes to land-grant colleges, and yet one objection I might have to this bill is that it might mean anything to anybody. You can drive anything through the title or the first section. And most of our discussion yesterday had to do with land-grant colleges with reference to State activities.

Secretary UDALL. Mr. Chairman, this is a very, very important question. It has arisen. We have given it considerable thought. And it seems to us that what the individual State does should be the State's decision.

The Congress might want to specify, but whether it would be the land-grant college or some other college, or whether a particular State wanted to put up sufficient money to have two water research institutes, one at your land-grant college and one at another university is a decision we think the States ought to make, and probably the best thing to do is to leave it up to them to make their decisions.

Mr. ASPINALL. Under this bill, though, the decision seems to be given to the Federal Government's agency. Is that not right?

Secretary UDALL. I am informed that it is contemplated by the bill that the State legislature or the Governor make the decision. But if this is not precise, if the legislation does not spell it out, the committee can certainly clarify that.

Mr. ASPINALL. In the first section, the policy statement, it says that it is the policy and purpose of Congress that the Congress speaks for the people, therefore it is the policy of the people of the United States to assure an abundance of water.

Now, reading that as set out in the bill, it would seem to me that it means the primary responsibility for insuring an abundance of water, and I will ask you what you mean by "abundance."

This is referring to a Federal policy; but it seems to me that this should be an integrated policy of private enterprise and the Federal Government and local governments.

Now, am I wrong, or am I right?

Secretary UDALL. I think you are quite right, Mr. Chairman, in the sense that this is our pattern and this is the way we are doing business.

Much of our water needs are taken care of by municipalities. There also is private endeavor in this field.

I think that what is intended by the statement of policy is that we need to have an adequate supply on hand for all of our different needs. Maybe the word "abundant" is misleading.

Mr. ASPINALL. A sufficient supply from day to day looking toward reasonable use in the future?

Secretary UDALL. Yes. The whole essence of conservation planning is to see that we take care of the needs of 25 or 50 years ahead. This is why this committee always has to have its eyes down the road.

And I think in that sense it means a supply sufficient for the various needs that are foreseeable in terms of the growth and development of the country and what is going to happen.

But this is a Federal, a State, and a local and a private responsibility. The Federal Government has many important functions, but it is not by any means the only agency that has responsibilities.

Mr. ASPINALL. On page 3 you bring to our attention the increase in the size of the water research budget over which you have direct responsibility. It has increased by two times in 2 years, 1962, \$17½ million; 1964, \$37 million, which is one-half or a little bit less than one-half of the amount of the entire budget, as I understand it, for 1964, for research activities and the water resource program.

Then you make reference, on the next page, to the enormous amounts of money that are being spent by different private enterprises in order to advance their businesses.

Do you have any idea what an ultimate budget, we will say, in 1970, for water resources research activities by the Federal Government should be? How much money should we be spending by 1970?

Secretary UDALL. I do not know, Mr. Chairman, that I could give you a figure, or that my people who have studied it could.

It would be my feeling, because of the general facts that I have recited, here, that our present level of effort or past level of effort, in basic research, is not adequate to help us prepare for the future, and that it ought to be substantially increased.

Whether this is a doubling or something on that order over a period of years, or more than that, I think I might give you some idea on that.

Mr. ASPINALL. Is it the feeling of your agencies and your Department that you can do anything if you have the amount of money that is necessary? That seems to be the attitude we have in space now.

Secretary UDALL. My understanding of it, Mr. Chairman, is going over it with my scientific people and water people is that what they are most concerned about, the Geological Survey people, for example, and the Bureau of Reclamation people, is that this is an area where we are short in scientifically trained people.

This, in fact, was singled out by the report prepared by the National Academy of Sciences. It is one of the areas where they pointed out and said that we are not doing enough to encourage people to get into this field.

I think this is the sort of thing that has caused fear and concern in some people. So it is not a matter of money as much as it is of having enough trained people. And that is where this program is directed.

Mr. ASPINALL. All right. Now we get down to the basic argument, here.

You do not get qualified people simply because you have money available. You may get people for these activities if you have your salaries high enough so that they are interested when they start

preparing themselves for their life's work, or you may get them provided there is a glamor to it.

A few years ago the atomic energy program was a glamour program. You could get all the money you wanted for that. Today it is the space program that has the glamour. You can get all the money, and the scientists are flocking in.

Do you know of any way in which you can make the study of water a glamour program?

Secretary UDALL. I am afraid if I have to rely on glamour, Mr. Chairman, this is one of the things that worries me, because the glamour programs are a magnet that oftentimes draw off many of the best people.

I think everyone is aware of the importance of water, and we are getting more aware of its importance. But it is an old field, and it is one where we do not have enough people, and are not going to have enough people in the future.

Mr. ASPINALL. Under our economy, under the private enterprise system, there is only one way in the world to get them, and that is to pay salaries at the end of the study and training periods that would be attractive to the individuals who are going to engage in it.

That is the difference between our ideology and that of our opponents in Russia. They pick out their bright people and say, "You are going to study water. You are going to go to the moon. You are going to study the atom."

Now, we have to have more back of this, in my opinion, than just an interest.

My colleague from Florida wanted me to yield.

Mr. HALEY. I would just make this observation, Mr. Chairman, and I thank the gentleman from Colorado for yielding. We ask how much money they are going to spend by 1970, or how much money they could spend by 1970. I could tell you right quick they are going to spend all the money they can get, because apparently we have now a philosophy of government that the more money you can spend, the more success you are going to get out of the program, not what you accomplish.

And insofar as the glamour programs are concerned, I might say to the Secretary the next glamour program we are going to spend huge sums of money on is reclamation, which is probably one of your pet projects.

Mr. ASPINALL. I will answer my colleague in this way. We are not going to spend any more money than the Members of Congress permit. But if our people demand it, we are going to give it to the Secretary and to about every agency that we have.

I am not interested so much in the few millions of dollars that are involved here. I am interested, though, in how we point this program in the beginning and what our goals are.

And I think, with respect to this goal of getting more scientists in this particular field, admirable as it may be, that just saying that we are going to get money for colleges in order to train scientists is not going to do the job.

Mr. Secretary, I have heard it said many times that this legislation is intended to implement one of the recommendations of the Select Committee on National Water Resources that the Federal Govern-

ment should undertake a coordinated scientific research program on water.

Do you consider that this legislation implements that recommendation?

Secretary UDALL. Well, of course an interval has occurred between the publication of the Kerr committee report and the sending of this recommendation up. But this proposal was considered by the scientific people in my Department and in Government, who are primarily concerned with our future needs in this area, and this was conceived and designed as the best way to implement this particular recommendation.

If I might so say, Mr. Chairman, on the comment you made a moment ago: One of the things aimed at is basic water research—for example, one of the areas of water research when private industry is very active is with regard, for example, to the production of the equipment necessary for municipalities to purify water, to handle water, things of that kind.

And of course industry is bearing a load in this field of technology. But when you get down to basic research and basic understanding of water, the type of work that your State water geologists do, that the Geological Survey does, that is the very necessary bedrock type of water work, you find today in most of the universities in this country that there not only are not any courses, there are not any experts. However, many States are looking ahead; they see that either they have problems today or they are going to have serious problems. Now, about the best they can do is to bring in people on kind of a fire-alarm basis to get things done.

One important thing is for the States to be able to tackle this on a continuing basis.

Mr. ASPINALL. They could, under the authority they have at the present time, set up these chairs, if they thought they were of utmost importance, and they could put their money into those activities rather than into the activities that you have at the present time.

Now, it is not your intention, is it, under this legislation to just automatically set up a chair for water resource research activities in every land-grant college or every State university that asks for it? That is not what you would do; is it?

Secretary UDALL. No, the State program is more varied than that, and what the State does is the State's business. We gather from the way they have responded that most of them feel an interest in water research and would like to get into it.

Mr. ASPINALL. I have talked with them, and I think most of them would like to have an additional chair, \$50,000-plus, because it lends more significance and more personnel to their operation. But as I understand it, just upon the request of the State, if it showed its interest, you are not automatically going to give this benefit, are you?

Secretary UDALL. No. That is correct.

Mr. ASPINALL. It is noted that the Senate struck out the provision authorizing the establishment of a new agency in your Department to administer this program. Has the Department made any study as to how this legislation would be administered, if it is enacted? Would the Department establish an additional agency to administer this program, or would it be administered by one or more of the existing agencies in your Department?

And this goes to the heart of section 104.

Secretary UDALL. Well, of course, just how we administer the program within the Department, where you have five or six or seven agencies that are concerned with various aspects of basic water research—this can be done by a committee. Or we could set up a coordinator of sorts, which is what the legislation proposed.

Mr. ASPINALL. Of course, you already have the authority to establish another bureau if you needed to.

Secretary UDALL. Yes, we could do it administratively; and in that sense what was proposed may be unnecessary. I think possibly a committee might be made to work, or it might be better to have some organization that would place the function in a different framework than it is in at the present time.

But this is a matter on which this committee can exercise its own judgment.

Mr. ASPINALL. Would it not be better to require matching funds from the colleges and universities, rather than 100 percent grants, for this part of the program.

Secretary UDALL. This might be better conceived in terms of finding out which States are really interested.

Mr. ASPINALL. The language in section 102 indicates that moneys appropriated pursuant to this legislation could be used "for the purchase and rental of land and the construction, acquisition, alteration, or repair of buildings necessary for conducting research."

I assume this means that either the universities or the States could use Federal funds appropriated under this act for the construction of physical facilities, including land, buildings, and equipment, for conducting research.

Is this a correct interpretation?

Of course, we are worried about this, because here we go again. We want to know how much of this money is going to be used for research directly and how much for administration and facilities.

Secretary UDALL. I think the way the language reads at the present time, because this does envision setting up a research center or institute, some of the money under this language might be used for construction purposes, where needed specifically for the water research work.

Mr. ASPINALL. You wouldn't want to pay any more of those physical facilities than absolutely necessary; would you?

Secretary UDALL. It would seem to me, with the overall purpose of the program, as I have tried to enunciate it here, as I look at this language, this should be primarily the function of the States, if they want to get into the field, to provide the facilities.

Mr. ASPINALL. As I understand the extent of the program, this legislation is a permanent program calling for appropriations of \$20 million a year after the program gets going. That is a correct understanding; it is not?

Secretary UDALL. Yes. That is right.

Mr. ASPINALL. This will not, in any way, however, do away with or diminish the requests for moneys in other activities that you are engaged in at the present time?

Secretary UDALL. That is correct, Mr. Chairman.

Mr. ASPINALL. In view of the limited funds and personnel available for research, do you think that spreading both dollars and quali-

fied personnel as thin as would be necessary under this legislation would be more beneficial than a more concentrated and centralized research effort?

In other words, would this provision make the most effective use of Federal funds and of personnel that are available?

Secretary UDALL. Mr. Chairman, I think that the legislation is properly conceived. The basic decision that we face in this field is whether to make the Federal program bigger, to have all of your water scientists and water research work, let's say, centralized in Federal agencies, or whether to get the States, the State universities, developing competence in this field.

And I think that getting the States into the business, developing a greater capacity in our universities, is the real answer, because then they will work on the specific State and local programs that are upcoming.

Mr. ASPINALL. In title 3, section 300, the authority is given to the Secretary of the Interior. Under the present situation, and what is contemplated here, would it not be better to have this authority given to the President?

Secretary UDALL. Well, this is, of course, one of these matters with regard to coordination and cooperation and so on where a question might be raised. As far as basic water research—and this is what we are discussing primarily—as against, let's say, the specific questions that HEW tries to answer, with pollution problems, Interior does have very heavy responsibilities.

Whether it would work better to have the President's science adviser perform this function is of course a matter that there could be difference of opinion on which would be very understandable.

Mr. ASPINALL. That relates to the other matter which you called to our attention in your presentation, if I remember correctly, and perhaps it would be better to have it centered in an agency that was not concerned alone in water research, but was concerned with all matters of research.

What would you think of that?

Secretary UDALL. I could see some advantage to that, Mr. Chairman, very definitely.

Mr. ASPINALL. Getting back to this question of qualified personnel, since there is a shortage of qualified technicians and scientists to conduct the water research programs, as you stated in answering some questions, will not the legislation result in some competition among the States and universities for the services of a relatively few experienced people?

Has there been any study made of the availability of qualified technicians and scientists, currently, that might be available to carry out such a program?

Secretary UDALL. Of course, the one paramount thing they keep telling me is that in terms of really good people in the water research field, they are very limited, and the purpose of the program is to put new emphasis on the universities and help them attract these promising younger people and develop new competence in this field.

There undoubtedly would be, as there is today within the Federal Government, some competition for some of the better people. A lot of the better people in the Geological Survey are being offered much

larger salaries by private industry, and some of them are being taken by other governmental agencies.

There is a shortage right now. We feel it in our own Department. But it seems to us that the real seedbed of science is the universities in this country, and this is the reason we ought to get them into the field more.

Mr. ASPINALL. I want to thank the Secretary.

I reserve the balance of my time.

Mr. ROGERS. Mr. Chenoweth?

Mr. CHENOWETH. Mr. Secretary, I have been interested in your comments on this proposed legislation in response to the questions of the chairman of the full committee.

I get the impression that this is a program designed to stimulate interest on the part of the States in doing more research on water.

Secretary UDALL. This is one of the main purposes of the program, yes. It is to get us in a situation in the future where we have adequate scientific know-how with respect to water.

This is one of our most common resources. It is one of the most vital to all of our activities, and yet we are encountering more and more problems, and the problems are going to increase.

And it is our opinion that we are going to find ourselves, as we do already, in a way, today, very limited in terms of personnel that are available.

Mr. CHENOWETH. Do you feel, Mr. Secretary, that the field of water research is now being neglected?

Secretary UDALL. I think that it is being neglected. I think that all of the studies made by scientific panels, and our own feeling in the Department, is that there is a very serious shortage developing in this area.

Mr. CHENOWETH. I wonder just what would be accomplished, Mr. Secretary, and just what you have in mind. What is going to develop from this proposed additional water research? Give me an example.

Secretary UDALL. Well, let me illustrate. Let's take your own State, for example, where, with the State having the varied topography that it has, there are many different types of water problems. You are more familiar than I with the many types of water problems you have in your State.

I do not happen to be familiar with the effort that is being made by your universities in your State, but it seems to us that rather than having merely Federal people, who are rushing around the country on a fire-alarm basis, if the States developed in their own universities now the type of water scientists and water experts that will be much better able to head off the water problems and to resolve them, we will be much better off than if we find ourselves short of the scientific know-how that we will need in the future.

Mr. CHENOWETH. What additional information will these experts develop?

Secretary UDALL. They will work, I would presume, with your State geologists, with your State people, with your irrigation districts, with whoever has a problem, with regard to water research.

It is not just a matter, as you well know, that water is something that you study only in a classroom. Much of water research activity involves actually tackling specific problems in the field. And we

would hope, in effect, that the States, the State universities, by developing new strength and new competence and able people, would be able really to do a big part of the job that we see coming up in the future.

Mr. CHENOWETH. Would this program be limited to State universities and land-grant colleges?

Secretary UDALL. As I said earlier, each State would decide where it wanted to set up research centers. We would hope this would stimulate activity, and that more than the land-grant colleges would get involved in the program.

Mr. CHENOWETH. It appears to me that the land-grant colleges are most interested. The only inquiry I have received was from Colorado State University, a land-grant college.

Secretary UDALL. In most States they are most interested in this type of thing.

Mr. CHENOWETH. Is that where the genesis of this idea originated?

Secretary UDALL. The genesis of the idea really came when the scientific people in Government, the water people, the people in my Department, saw the need, and we sat down then to decide what the proper vehicle was.

And looking to the tremendous success of the agricultural experiment programs, which is a Federal-State program with very heavy emphasis on State responsibility and State performance, we felt this was a good pattern to follow, yes.

Mr. CHENOWETH. Do I understand the States would not make any financial contribution to this program?

Secretary UDALL. No. This would be a matching program.

Mr. CHENOWETH. I thought in answer to a question of Mr. Aspinall you said it was a matter of Federal grants, and there was no local program.

Secretary UDALL. The title I phase of the program is a matching program, 50-50 matching. The title II program is not.

Mr. CHENOWETH. Tell us about title I and title II.

Secretary UDALL. The title I program would be a program with the States to encourage the States to set up water research centers or water research institutes in whatever universities they chose to set them up in. The legislation does not specify land grant.

Mr. CHENOWETH. How would this be financed?

Secretary UDALL. It would be financed 50-50, State-Federal.

Mr. CHENOWETH. In other words, if the State did not want to go into that program, nothing would be done?

Secretary UDALL. That is right. It would be up to each State.

Mr. CHENOWETH. How about title II?

Secretary UDALL. Title II would be a broader program, in which, again, we would be attempting to attack specific problems and to encourage universities and educational institutions to develop competence in this field. And in this instance let's take your own State.

Let's say the State of Colorado decided that the Colorado State University, or Colorado University, would be the university where you would have a water research center. But then, under the title II program, if there were a particular large problem or long-term problem, there could be contracts with other universities or even with non-State universities, under this, to do particular research programs or engage in particular research projects.

Mr. CHENOWETH. Title I would be confined to land-grant colleges or State universities?

Secretary UDALL. That is correct, at whatever public educational institution is designed by the State.

Mr. CHENOWETH. Under title II you could establish the program in any college?

Secretary UDALL. It would be more similar to the sort of thing that the National Science Foundation does now, in contracting with public and private institutions for particular types of work.

Mr. CHENOWETH. It is two separate and distinct programs?

Secretary UDALL. That is correct.

Mr. CHENOWETH. First you want to encourage the States to set this program up in the State colleges?

Secretary UDALL. That is correct.

Mr. WHITE. Under title I, there would be no grants, then, Mr. Secretary?

Secretary UDALL. Oh, yes. There would be matching grants.

Mr. WHITE. It would be matching funds in every instance?

Mr. ASPINALL. If my colleague will yield, all he needs do is read section 100(a), and he will find there are no matching funds at the present time in connection with 100(a). The matching funds come in 100(b).

Secretary UDALL. Yes. I am glad the chairman corrected that. There are two phases to it. The 100(a) grant is to encourage each of the States to get started, to get into the field, but the additional effort that is made beyond that is on a matching basis.

Mr. WHITE. Additional water resources research programs under title II, page 8 of the bill, provides for money that can be used in grants, contracts, matching, or other arrangements with educational institutions, private foundations, or other institutions; with private firms and individuals, and other arrangements at the discretion of the Secretary. Is that not correct?

Secretary UDALL. Yes.

Mr. WHITE. The question I was driving at: Would these be in unison? Would they be cooperative agreements? Could a university avail itself of both programs?

Secretary UDALL. The answer is "Yes."

Mr. WHITE. They would not be divergent programs?

Secretary UDALL. No; no. Not at all. And this is where the coordination aspect comes in.

But the title II program would work much as the National Science Foundation grant program in broad scientific research works, in the sense that any universities, we would anticipate, under the title II programs—any universities, both State and private universities, if they had a particular problem in their State, would present a proposal and say, "We would like a grant, and we will put up money of our own."

There could be any number of kinds of proposals, they would propose a specific program or a particular research project.

Mr. WHITE. The only last question I would like to ask you: Is title I only for land-grant colleges, as defined in the first section of title I?

Secretary UDALL. No; not land-grant colleges. It would be the land-grant college or whatever educational institution the State wanted to develop.

The State, if it wanted to, could say they were going to have two research centers or two research institutes, and they could divide the money between two educational institutions.

So that it is not necessarily confined just to the land-grant university or college.

Mr. WHITE. But they would be publicly supported?

Secretary UDALL. Yes. That is right; publicly supported.

Mr. WHITE. Thank you, Mr. Chenoweth.

Mr. CHENOWETH. As I understand, under paragraph (a) the Federal Government goes into the State and gives them \$75,000 to start with.

Secretary UDALL. This is sort of beginning money.

Mr. CHENOWETH. Without any State or local obligation. Is that right?

Secretary UDALL. That is correct, except to establish the center as defined in the bill.

Mr. CHENOWETH. And this program would be confined to land-grant colleges or State universities?

Secretary UDALL. Or other such institutions as any State shall determine.

Mr. CHENOWETH. The money could be divided among 10 of them?

Secretary UDALL. That would be up to the State. It would not be very prudent to divide it very far, I would not think.

Mr. CHENOWETH. Then what would happen under (b), after you have given them this money?

Secretary UDALL. The \$5 million to begin with would be on a 50-50 basis.

Mr. CHENOWETH. What is that for?

Secretary UDALL. That is for the specific research programs and the particular effort that would be made, that that State might want to make, in the whole field of water research.

Mr. CHENOWETH. Suppose the State were to say, "We are satisfied with the \$100,000"?

Secretary UDALL. The State would be free to do that.

Mr. CHENOWETH. Then there would be no matching program at all?

Secretary UDALL. That is right.

Mr. CHENOWETH. The State is not going to put up money if the Federal Government is going to finance the program. That is obvious to me. That would be the end of the matching program. Would that seem logical to you, Mr. Secretary?

Secretary UDALL. I would think some States might do that. We are hoping they will get into it with both feet. And many of the States that already have water problems are most anxious to get into this field.

Mr. CHENOWETH. Some States with peculiar local water problems might respond to the appeal, but the average State probably would not. Would that be a fair observation?

Secretary UDALL. I think the average State today has some kind of water problems and some pretty serious ones, even the States that have abundant research.

Mr. CHENOWETH. You are going on faith and hope, then, in this matching operation?

Secretary UDALL. We have had over the last 6 months or more contact with people in most of the States, and the general reaction has been very favorable.

Mr. CHENOWETH. How much time elapses between the donation of the \$75,000 to start with and the start of the matching program?

Secretary UDALL. It would all be at the same time.

Mr. CHENOWETH. You do not give the State any time to set up this department in the university or college?

Secretary UDALL. They could move as rapidly or as slowly as they wanted. It would be up to the States.

Mr. ASPINALL (presiding). Mr. Haley?

Mr. HALEY. Thank you, Mr. Chairman.

Mr. Secretary, what is your Department or any other department of the Government doing to confine and coordinate the activities of the various departments now that have some responsibility in water research?

I note that Agriculture, Commerce, Defense, HEW, Interior, AEC, and various other agencies of Government have various and sundry programs. How do you know what you are doing and who is doing what? Is there any place where this data that you are accumulating becomes available to the people, and where you can look around to see what the other fellow is doing?

Secretary UDALL. I would say, Congressman, that most of the coordination that is being done today is in what is called the Federal Council for Science and Technology, which is an interagency group which Dr. Wiesner's office heads.

And there is no type of complete overall day-to-day supervision, but various ad hoc committees do meet from time to time on specific problems, and there is a very substantial effort being made to eliminate overlaps and to coordinate effort.

This is a field, however, where I think greater coordination is necessary. I think Dr. Wiesner would say the same thing. And I think this is one of the things that we hope might be accomplished by taking a new, broader look at this whole field of water research.

Mr. HALEY. That brings up the question, then, Mr. Secretary, of why somebody in the Government has not come up with legislation that is needed, or if coordination between the two Departments is now possible, why that has not been initiated, rather than coming here and attempting in the original instance to set up another agency of the Government.

Secretary UDALL. Well, we are not proposing basically to set up another agency. We are proposing to set up a coordination mechanism to do the exact job that you indicate should be done.

I would agree strongly with you that there ought to be as full and complete coordination as possible, to see that there is not overlap. This is not an area where we have enough effort being made, where we have enough money being spent, in basic research, and this is one of the basic ideas behind the bill.

But we certainly ought to have the highest degree of coordination to see that we do not have overlap, and that we are getting the most effective use of the money that is being put into this field.

Mr. ASPINALL. If my colleague will yield at that point, yesterday, when Mr. Byerly was here from the Agriculture Department, he ad-

mitted that up to now, although they have tried to coordinate and correlate all of these activities that they had under his jurisdiction, they had been unable to do so. He was unable to assure us that there was no duplication in the activities under his jurisdiction.

I suppose that you are not sure, with the five or six agencies you have doing work in this field, that you are not duplicating something at the present time. Or are you?

Secretary UDALL. Well, my expression of feeling there is greater need for coordination is with regard to the different Federal departments and agencies.

Mr. ASPINALL. I am not talking about departments, now. I am talking about agencies.

Secretary UDALL. But I think within my own Department at the present time we have pretty good coordination.

Mr. ASPINALL. You have no duplication?

Secretary UDALL. I think that the area of duplication in research is relatively minimal, where we have people who are operating doing the very same type of research.

I do not know of duplication in the Interior Department. If any areas of this kind come to my attention, something is certainly done about it. I would say within my Department we have very good cooperation. But I think within the different departments which are concerned, I see some need for what the Congressman from Florida is talking about.

Mr. HALEY. I think not only in this, Mr. Secretary, but in all branches of the Government we seem to have arrived at a situation, here, in Government, that builds up huge overall pictures until no one man or any one group of people can properly supervise.

It seems to me like there is a tendency on the part of the various Government agencies, all of them using taxpayers' money, and to some extent, I think, in my opinion, that they are hiding some of the things they have already found, and we are going back with another department and going over the same ground.

And of course that is an absolutely useless expenditure of money, where you have made a search or research of a particular thing, there should be in Government some way that all research activities come under one group or one department, so that we can know what we are doing.

You are well aware, Mr. Secretary, that the expenditures of the Federal Government now in research are approximately \$15 billion. That is 16 percent of the total budget of the U.S. Government. And that is a huge amount of money.

Secretary UDALL. Well, Congressman, I do not think anyone would disagree with your general statement.

President Eisenhower in 1957 or 1958 for the first time took a science adviser to do a coordinating function, basically, as well as to advise the President himself. And the fact that this office has been continued and expanded is an indication of an awareness that this is absolutely necessary.

When we get to the water research field—because this is not a glamor area, it is an area where we are shorthanded, really, and it is an area where even more than elsewhere, we cannot afford duplication, we cannot afford overlapping.

And I think we need tight coordination. I would agree with you on that, and I am in favor of it.

Personally, from our experience at this point, I feel that the Office of Science and Technology can do this job. There is no point in wasting money when you are short of money and short of personnel, having two people, one in one department and one in another, doing the same type of research that overlaps.

Mr. HALEY. I agree with you, Mr. Secretary, that the amount going into water research is a very small percentage, one two-hundredths, of the overall picture.

And the gentleman knows that I have been interested in water conservation. We have had a saline water program in which I was very much interested, and I did all I could to bring about the enactment of that bill.

More and more we must begin to realize that water is not inexhaustible. The old saying down in my part of the country is that you never miss water until the well runs dry. And that is what we are going to be faced up with one of these days, an insufficient supply of water.

I want to see everything done that is reasonable and necessary to conserve and to bring about the proper use of water.

I have, for instance, urged my own State of Florida to set up a water program. I want to see them get to the point where there is an allocation as to the uses of water, and so forth. We had an abundance down there, but I can see the possibility of the well running dry in Florida, strange as that may seem.

So I want to spend all the money necessary, but I do not like to see program after program started here with apparently no coordination.

Now let me ask you this, Mr. Secretary: Apparently private industry, in various forms, connected with their operation, is already spending \$12 or \$15 billion in research, naturally pertaining to industry.

Do you not think private industry, when the need becomes apparent, will do a lot of research in this water field?

Secretary UDALL. Congressman, I think our present experience is, because of the fact that the States, the Federal Government, your local municipalities, so many of them, have basic water responsibilities—private industry will do a very good research job as far as technology is concerned, as far as machines to transport and process water, particularly for municipal and industrial purposes. I think there is an adequate job being done, and that will be done.

But this bill is directed toward the type of water research on which their efforts and the efforts of all of our public agencies are based. And this is the unglamorous area, as it were, where the shortage really exists.

The other argument, if I may go back to your point a moment ago, and it is a very sound one, with regard to coordination, is that if you set up a program of the type we envision here, you get the States deeper into the field, and some of them into it for the first time, in doing water research work, and then you have not only the job of coordinating the Federal effort, but you have the job of seeing to it that the various States and their efforts are coordinated on a total basis, and this I think makes it even more important to have this type of oversight and coordination that you are talking about.

And I think we ought to have it. I am all for it.

Mr. HALEY. I am glad the gentleman and I agree on one thing, at least.

In the proposed legislation, Mr. Secretary, there is no program here that requires matching funds by the States, is there?

Secretary UDALL. Yes. The 101(b) part of the program, encouraging the States to set up water research institutes, is on a matching basis.

Mr. HALEY. Fifty-fifty?

Secretary UDALL. Yes. That is right.

Mr. HALEY. Thank you very much, Mr. Secretary.

I want to assure you again that I am interested in the conservation of water and research, but I think we can all do a great job by trying to get some cooperation between the various State agencies of the Government.

Mr. NYGAARD. We went into some discussion of this at yesterday's hearings, when other witnesses were before us, Mr. Secretary.

What may I gather as being the prime purpose of this legislation? Is it to develop new personnel and train them for the type of research that we are going to do, or is it to make use of those that already exist?

Secretary UDALL. Its overall purpose, I would say is to enlarge our scientific and engineering competence—because naturally you cannot tackle a basic water problem, you cannot resolve it, unless you have the scientific capability to do it.

And this bill is to encourage the development and enlarge the potential that we have in this country in terms of dealing with these basic water problems.

And I think that the one thing that it should achieve—it is a water resources research act—is to broaden the whole effort that we are making, and, as part of the process, and as the ultimate product of the process, to give us more trained people at the State level and at the National level, so that we can deal with these problems that are upcoming.

Mr. NYGAARD. On that basis, then, we could stop with title 1 of this bill, and the other efforts could be handled, as I see them, through presently existing agencies and efforts in this direction, because title 1 provides for the work with the universities and colleges and the training of this personnel, and as I gather it, the balance of the bill deals with funds for research with private foundations and other institutions, which could be handled without this legislation.

Secretary UDALL. Well, we think a program of this kind would complement and would round out the program, and is quite vital from that standpoint, because we would have on the one hand getting the States, with the State effort, into the field.

But, of course, as you well know, many of the finest scientific institutions in this country are not land-grant colleges. Some of them are private institutions. Some of them may already have competent personnel. Some of them have their own relationships with the State.

In fact, I think you would find that many of these institutions often-times have State grants or grants from other governmental agencies to study particular problems, and they may have trained staff people, too, and they should be brought into the program, and in specific instances on specific research programs, they would participate in it, and it would not be just a land-grant college program pure and simple.

Mr. NYGAARD. But are we not working away from the area of coordination of present activities by establishing new directions?

Secretary UDALL. No. I think we have to do the best job we can of developing competence, of developing experts, of developing interests, in all of our universities, wherever possible.

And as I indicated earlier, there are so few of our major universities in this country today that have courses in the hydrosociences, and that have the type of trained personnel that can teach, even, because you have the problem not only of having people work on specific problems, on what I would call a fire-alarm basis, but you have to have people who are teaching the people who are trying to become the new water scientists.

I think we ought to encourage them wherever they are. And if there are particular research projects or programs, that we should be pursuing, title 2 would give us the vehicle to work on this part of the problem.

Mr. NYGAARD. Now, as to training the personnel, under title 1 of this bill, would that not be better served under Health, Education, and Welfare, which deals with educational matters?

Secretary UDALL. No, I do not think so at all, because this is a specialized field.

You are of course familiar with most of the education legislation that is passed, that it is legislation of general aid. However, the real purpose of this bill is to zero in on this water research problem deficiency and to do something about it in this field.

And I think this is the proper approach, rather than simply saying to the universities, which is really what we are already saying, without too much effect, that we hope they will get into the field in a bigger way.

Mr. NYGAARD. We have moved into practically all of the Departments of Government today with water research. Would we not be better off if we brought this into one agency, so that the efforts would be all coordinated and properly directed, and would not we also be in a better condition if we did that with education as well?

Secretary UDALL. Well, I have expressed the opinion, and I strongly feel, that the more State effort that is made, and the more the responsibilities of the different Federal agencies increase, the more overall coordination is necessary.

You should have at some point in the Government a catalog that shows what is being done, and the particular types of research that are underway and the particular types of projects that are being worked on, so that you can avoid duplication and waste.

And I am all for that. But I am also, simultaneously, for the maximum effort that we can make in all of our universities, in this field of research, because it has been identified by the best scientists in the country as one glaring area where we are short handed and we are going to be more short handed as we go on down the road.

Mr. NYGAARD. As I look at the charts contained in the Federal water research activity, dated March 25, 1963, for instance on page 184, under the subtitle VII, economic and institutional aspects, we are dealing with economic management.

I find Agriculture is spending \$343,000; Commerce, no expenditure; Defense, \$78,000; HEW, \$114,000; Interior, \$814,000; AEC, \$100,000; and TVA \$4,000.

There we have an example of definite duplication.

And I go back over that chart, and looking on page 182, I find water cycling, subtitle II, in the area of precipitation, and you find Agriculture is \$514,000; Commerce, \$322,000; Defense, \$168,000; Interior, \$213,000; and TVA, \$43,000.

There you have all except Health, Education, and Welfare in that one area, and there are many other areas of duplication.

Is it necessary that all of these be studied? We must be going over the same road. I feel new legislation should rather be toward coordinating our effort. Maybe the money we are expending today would be adequate, and if not, we could direct our activities to the area in which we are lacking, rather than generally speaking not knowing what is actually happening today.

Mr. ASPINALL. May I interrupt?

Dr. Wiesner is here. And as I look at this operation this morning, we will take the rest of the morning questioning the Secretary. Is that correct? Do all on this side wish to ask questions if we have the time?

Mr. WHITE. If we have the time.

Mr. EDMONDSON. I will not take more than about 30 seconds.

Mr. ASPINALL. How long will you take?

Mr. BURTON. Three minutes.

Mr. WHITE. At least 2.

Mr. SAYLOR. I want to see that Mr. White gets about 10 minutes, over there, because he is always on the tail end of the line.

Mr. ASPINALL. I think under those conditions, it would be better just to go along like we are and question the Secretary, and let Dr. Wiesner come back, because he has a prepared statement, and I think we will want to ask him some questions.

Doctor, we are very pleased that you did take time to come up this morning, and we will be glad to have you make yourself available later on.

Secretary UDALL. This question is one you might want to direct to Dr. Wiesner tomorrow, Congressman.

I am familiar with most of the research that is going on. I think you would find much less duplication and overlap than you think, because each of these departments at the present time has its own principal focus in the research it does.

Take the Department of Agriculture. They are primarily interested in the relationships, the water research relationships, of water to soils, to plants, and so on. And the Department of Commerce is concerned with weather through the Weather Bureau and so on the various departments are interested in other aspects of water.

Water is complex. It affects so many of our activities. Usually an agency has been given money to study a particular phase of the water problem as it affects a particular activity. And I am not saying there is not some overlap, but I am saying—rather than drawing the conclusion from looking at this, that we are all in the same business—are we not.

We are all working on specific problems, and overlaps develop. I am not saying for the moment there are not some overlaps, but I would think the overlap is an area of less than 10 percent overall, and this is the area where we need coordination.

I think coordination is very important. But I would not agree at all with the conclusion that if we had coordination today we would not need a new research program of this kind. I just do not think the facts would support it.

Mr. NYGAARD. I am very interested in water research and the use of water. It is true of my State, but to a lesser degree than your own State. However, we are rapidly approaching the point where we are going to be badly in need of it.

And my only reason for asking these questions as if there is some way that these things could be coordinated to a better degree to make it easier for us to understand what is taking place—that is the reason I wanted to ask these questions, to get that information.

Mr. EDMONDSON. I would like to congratulate you, Mr. Secretary, on a very fine presentation.

I think this legislation seeks to implement one of the major recommendations of the Senate Select Committee on National Water Resources, which was headed during its tenure by one of the outstanding congressional authorities on water needs that we have seen serving in this country for many years, the late Senator Robert S. Kerr.

I certainly support wholeheartedly the objectives of this legislation, and the program that it would provide. And as an evidence of my feeling on the subject, I intend to introduce an identical bill this afternoon, and will do all in my power to see that it is reported as soon as possible.

Secretary UDALL. Congressman, if I may just comment briefly, I did have the opportunity, when this legislation was being prepared last fall, before his death, to talk to Senator Kerr about this, and he had a great deal of enthusiasm for it.

And I think, myself, that this would be one of the most significant steps that Congress could take. It has already taken some steps, and this committee has taken some, such as strengthening the saline water program.

This would be one of the most significant steps that could be taken to implement this report, which looked on down the road and said, "Let's be prepared for our future needs in this country."

Mr. ASPINALL. If my colleague would yield to me, I would suggest if he looked over the Senate bill and the House bill, he might decide which he wanted to introduce, because the Senate did change the bill on the floor.

The gentleman from Kansas?

The gentleman from California?

Mr. JOHNSON. Thank you, Mr. Chairman.

I want to commend the Secretary for his very fine statement and his frank answers to the questions that have been asked this morning.

I believe, Mr. Secretary, you know that our State universities and several of our State colleges are very much interested in this program, and for the most part, the people in California would very much like to see this enacted.

There is only one question here: In funding the various States, where the States choose the various places in which to put the program, how much control will you have over duplication within the States?

Secretary UDALL. Well, largely, the coordination function, I would think, within States, would be a State responsibility, and the State, in allocating whatever State money is spent, in a large university system such as your State has—I dare say there is pretty good coordination. But I think that initially should be their responsibility, except that in determining what is done nationwide, it does seem to me that we ought to have one catalog here in Washington that shows what is going on, what the States are doing, what the different Federal agencies are doing, in order to prevent needless overlaps and duplications.

Mr. JOHNSON. California probably has as many water problems as any State in the Union. But also in the region, there, we generally work pretty closely together among the Western States as a group on many of the experimental programs in the field of agriculture.

Washington, Oregon, and California have gotten together and carried on research programs with each university in the various States doing a part of it.

Now, California has as many water problems as anyone, and other States in the area have like problems, and I am sure that this program would be coordinated to some extent.

At the present time, we are doing everything we can to carry on this program within the State, as you well know, on about three campuses of the University of California at the present time, in basic research and applied research.

Secretary UDALL. Congressman, your State, because of its problems, I think, is making a greater effort than almost any State. But the essence of this program, and this is the reason I think the Congressman from Florida and I found ourselves in agreement a moment ago, is that the more we understand about water, the more research we have done, the better we can not only manage what we have, but also conserve what we have.

And in that sense, what we are really talking about is being able to understand a resource better, so that we can conserve it better, whether this is evaporation losses or whatever it is.

The whole history of the uses of resources in this country is that as our knowledge has grown, we are able to conserve and manage better.

Mr. JOHNSON. I am very much interested in and will strongly support this piece of legislation.

Thank you, Mr. Chairman.

Mr. ASPINALL. The gentleman from Utah, Mr. Burton.

Mr. BURTON. Thank you, Mr. Chairman.

Mr. Secretary, I think you will be interested to know that the Utah State Legislature a little more than 2 years ago on recommendation of the Governor established a water research laboratory at Logan, Utah, at Utah State University, and they are proceeding with this work already on a State level.

Mr. Secretary, on page 9 of your prepared statement you said, and I quote:

The study revealed certain very important gaps which no agency's present research programs are designed to fill, by providing the needed information.

I think, for the sake of the record, it might be beneficial to us all if you elaborated just a little bit on the gaps that are present in current research programs.

Secretary UDALL. Well, let me, to be brief on it, quote to you from the report prepared by the Federal Council for Science and Technology, and this is the basic document on this, and I think it is a very fine report on water.

Mr. BURTON. This is the study that you have reference to in your statement?

Secretary UDALL. Yes.

Quoting from page 21 of the report, which is the committee print dated March 25, 1963:

Even without an extensive evaluation, deficiencies in intramural and extramural education and training, in research on ground water (including the infiltration process and soil-plant-water relationships), and in socioeconomic research are so evident that we can immediately recognize the need for increased future effort in these fields. Similarly, the opportunities for water quality research are so great, and the demand for results so pressing, that a much higher level of sustained effort should be undertaken.

Now, I think I can assure you that as far as most of the areas of water research is concerned, and I think this is what your statement would say, there is need for a greater effort in almost all fields of water research.

It does encourage me to know that your own State is one that on its own, without being invited by the Federal Government, has moved in this direction, and the Governor of your State happens to be a man long interested in water and has a water background.

I just wish more of our Governors had his background, and I think that we would have more of the States really moving forward rapidly on this.

But the fact that Utah has acted I think bears out the importance of our having State action, and the more the better.

Mr. BURTON. I think you are right and I thank you for this contribution. I think it will fit appropriately in the record.

On page 11, also, of your statement, you suggest the possibility of regional centers being established, by combinations of States.

I wonder if you are really optimistic that States X, Y, and Z will get together and designate State X as the center for all of them? Do you think that this is a real possibility? Or will not each State want to participate separately in the program?

Secretary UDALL. This might present a problem, because the proper setting to study water is the water basin, the watershed. This is what all the scientists tell us.

Take a river basin like the Colorado. What happens in one State, what happens in one area, with regard to quality of water and the amount of water yield of a watershed, and your total overall problems, affects everyone else downriver.

And it may be that we are expressing more the hope, here, that the States will work together on their common problems.

I think this is the area to expect cooperation to develop.

Mr. BURTON. Did I understand the colloquy between you and the gentleman from Colorado, Mr. Chenoweth, correctly, in meaning, that under section 100(a), each State is going to get \$100,000 after a period of 2 years, and that this will be a continuing thing?

Secretary UDALL. That is correct.

Mr. BURTON. There will be no end to this program?

Secretary UDALL. That is correct.

Mr. BURTON. Regardless of the results that a State might produce, they are going to get the \$100,000?

Secretary UDALL. That is the way it is envisioned; yes.

Mr. BURTON. It seems to me that you ought to have some check on this sort of thing. In other words, I can envision every State taking \$100,000, and some States not producing anything with it. Do you think there would be a danger of this?

Secretary UDALL. Well, there is language here that is at the bottom of page 2 and at the top of page 3 of the bill to provide guidelines for the effort that should be made. It may be that tighter supervision is needed. I do not know. But I do think there ought to be a follow-through. We ought to see that we are getting our money's worth as far as the program is concerned.

Mr. BURTON. I think that is correct. After 2 or 3 years, and if in your judgment they have not made \$200,000 or \$300,000 worth of progress on water research, I think there ought to be some way to shut it off.

Secretary UDALL. We certainly anticipate that any of the States that get into this field are going to put it into the hands of competent water scientists, and that those who do not have water scientists, and some do not, will get them, although the supply is limited.

But you are quite right. We expect to get a dollar's worth of research for a dollar spent.

Mr. BURTON. I thank the Secretary for his responses, and I have no other questions.

Mr. ROGERS (presiding). Mr. White?

Mr. WHITE. I am very happy to have the opportunity to ask the Secretary some questions with respect to this problem, and the water resources problem that exists in the United States.

First, in title 1, page 3, line 3, it says: "* * * conduct competent researches, investigations, or experiments"; and on line 12 it says, "* * * to water research projects."

And then, on line 1, page 9, title 2, it says, "research."

In each instance it says "research." We have talked, here, about training people, personnel.

Will there be any direction, under this legislation, if it is enacted into law, to actually conduct classes to provide for people that will be trained in this field, to increase our personnel?

Secretary UDALL. Well, of course, this will be up to the educational institutions themselves, and they will bear a very heavy responsibility in this field. And all of our water scientists today, the people in the Geological Survey, for example, come out of universities.

The university is the breeding ground for scientists. And how they carry out their programs is their business. But I think our experience has shown in the past that if you have water research money available, if the legislature is appropriating money for a water research institute in the way the State of Utah has apparently done recently, the scientists in the research universities will be encouraged to add courses.

It will encourage them to take promising young people that are science minded and say, "Why don't you go into hydrology? Why don't you go into this field? We have a research grant here."

In fact, the whole development in this postwar period, this tremendous increase in Federal research and private research—the whole tendency of the universities has been to encourage students to study and to encourage effort being made in fields where research grants are available.

And I think this is what we would be doing for water science with a program of this kind.

Mr. WHITE. I realize that we have to have some kind of impetus on education to get people to enter this field. And I am wondering if this will do this, or whether this money will be spent by the universities for going out in the field with research projects that are similar to the ones that are already being conducted by the USGS.

I would like to cite specifically my own State of Idaho. I was in one of your offices in Sand Point the other day where they are measuring waterflows in the Clark Fork River and its tributaries.

I am wondering if this will not be the type of thing that will be accomplished by this particular legislation. It is pretty hard in a university to sit in a laboratory and say you are studying research on a problem that involves streamflow or underground water or surface water, whatever it is, because you have to go out in the field to find out what you are talking about.

Secretary UDALL. That is exactly it. Any water research program is not only a laboratory thing and a classroom thing, it is fieldwork. It is very essential in this type of area. And what you are underscoring, I think—and this is one of the reasons that I am for coordination, so that what the Geological Survey is doing in Idaho is related to what the University of Idaho might be doing if they were participating in the program, and to ascertain that they are working on different problems, that they are exchanging information, and that the whole effort is one effort.

Mr. WHITE. Well, I want to say to you, Mr. Secretary, that I am very much in favor of this type of legislation, and I happen to come from a State where we have, at least in the north half of the State, a great deal of water, and we have a great deal of underground water in the southern half of the State, and you happen to come from a State where they thought at one time they had a great deal of water, and the water table is receding rather rapidly.

They cannot buy casing fast enough to put on the pumps to keep up with the demand. And you have had legislation in your State restricting the use of wells and the drilling of new wells.

I would like to see a program in my State instituted that would not have us in the same condition the State of Arizona is in.

Secretary UDALL. You are wise.

Mr. WHITE. In that, I think the USGS has a real mission in the State of Idaho. It has often been said that the underground water in the plains above the Snake River is unlimited, but I am sure this is incorrect, that it is not unlimited.

We are installing new pumps every day. There is a greater pump irrigation increase in Idaho than in any other State that also has diversion-type irrigation. So I think that there is very much needed

a resource evaluation in the State of Idaho, and I would like to ask that USGS look at every aspect of this problem.

And I would like to say that the president of my university, Mr. Theophilus, is very much interested in this program. He has been here in Washington, and was in my office the other day.

Some of the members of this committee have indicated economy in this area. But I happen to live in an area where huge cedars shaded the streams. You could lay down and drink anywhere you wanted. But the trees have been cut down and the temperatures have risen, and you cannot lie down and drink.

It used to be that you could drink out of Lake Pend Oreille, but with the pollution coming into this huge body of water, the boats, the summer homes, that pump in the sewage, are going to spoil this if we do not have some evaluation of our water resource.

And I think that this legislation is very necessary. I think that we are going to have to take a real look and spend some money, because ultimately we are going to end up without the water that we need.

And I would like to commend you for being here and for stating as honestly as you can the answers to the questions that have been asked of you.

And I would like to have you do one little thing that I have requested of you, and see if you cannot give some impetus to the USGS evaluation of underground waters in Idaho.

Secretary UDALL. Thank you very much, Mr. Congressman, and just to make the point I made earlier, Mr. Congressman, the best way to conserve water is to understand water. And the areas where we have made the biggest mistakes and are making the most shortsighted mistakes today are areas where we do not understand the facts about our use of water.

Mr. WHITE. I think pollution control is going to be one of your big problems.

That is all the questions I have, Mr. Chairman. Thank you.

Mr. ROGERS. Mr. Morton?

Mr. MORTON. Mr. Secretary, first I would like to express my sincere appreciation for your visit into my district.

I also would like to apologize for what I do not feel was a good exhibition of hospitality.

However, I feel we all should be proud of the Secretary for the way he handled himself under what I would call the hot sun conditions of the Eastern Shore.

There is one point in this bill, Mr. Secretary, that I wanted to ask a question about. That is section 305, which has to do with the reporting or evaluation phase of this program.

And as I understand it, the section says that there will be a report following the fifth year of operation of the act. Does it not seem that this is a long time before the Congress has an opportunity to evaluate this program? Should there not be in your mind an interim reporting to evaluate the weaknesses and the strengths of the program as they exist, say, at the end of the second year or third year?

Secretary UDALL. Congressman, it is pointed out on page 7, line 11, that the Secretary of Interior shall make an annual report of receipts

and expenditures and so on, and perhaps that is a little too limited.

Mr. MORTON. That is a fiscal report; is it not?

Secretary UDALL. Yes; that is right.

But I think perhaps it will take 2 or 3 years to really get the program into operation, but I think the committee might want to know before the fifth or sixth year just how it is functioning and inquire into it.

And knowing this committee, and knowing the chairman and the subcommittee chairman, I imagine, just as they have with the saline water program, which is a new program, you will want to bring us in from time to time and actually have us report in person.

But I am all for Congress knowing, and I think we ought to know, what we are doing, and what progress we are making, and where its weaknesses are, and so on, and I would not object to anything that the committee wanted to strengthen that aspect of the legislation.

Mr. MORTON. You brought out the point that you felt that water research was dealing more with geographical areas such as watersheds. Is there going to be enough control over the programs instituted by the States themselves, through your Department and other agencies, that will insure this watershed type of research, as opposed to research such as from the State?

Secretary UDALL. I would have a great deal of confidence, from my own experience, in these water scientists and water experts, whether they are State people or whether they are Federal people. These people use the scientific approach. They are highly competent.

They are only interested in getting at basic facts and basic problems, and I think the problem will be in good hands if we can get the States to get into the field, the way the State of Utah has done recently.

Mr. MORTON. But there is not going to be any centralized effort to allocate problems in any sense of the word. This will not be directed research from the Department of Interior, will it?

Secretary UDALL. In a sense, I think there has to be some, yes; and I think this is provided for. You have to know what people propose to do, and what areas they are working in, and other people have got to know. Otherwise, you have two States, for example, side by side, doing identical work, and I think this is probably duplication and waste.

But the scientists themselves, who are going to run this program, I think are pretty good, providing we have a mechanism for coordination.

Mr. MORTON. That is the point I wanted to get at, to make sure, though this is a shortrun approach, it is going to be held together, so that there will not be this duplication of effort, and so that certain fundamental watershed-type research will be accomplished through the expenditures of these funds.

I take it you feel that it will be.

Secretary UDALL. Yes.

Mr. MORTON. Thank you very much, Mr. Chairman.

Thank you, Mr. Secretary.

Mr. ROGERS. Mr. Saylor?

Mr. SAYLOR. Mr. Secretary, it is always a pleasure to see you before the committee and hear your testimony.

Now, having listened to questions that have been asked you, and your prepared statement, I am worried. And I am worried because

of what happened to another piece of legislation that was before the Congress a few weeks ago. That was the Area Redevelopment Act and its proposed extension.

Mr. Secretary, I can tell you from my own personal knowledge of enough votes against that bill because the Area Redevelopment Act and those who were administering it gave a sizable grant to the State of Oklahoma for recreation. And many people, on both sides of the aisle, said to me that if this was the kind of thing that ARA was going to do, then there is danger for other programs dealing with recreation.

Now, having that in mind, I view with alarm what may happen to this bill when we get it to the floor. In view of your statement, in view of the statements made on the Senate floor, in view of the testimony of others that I understand are to follow, there will be duplication of effort on behalf of the Federal Government.

Now, would you care to comment on that facet?

Mr. EDMONDSON. After the Secretary comments, the gentleman from Oklahoma would like to comment, if the gentleman will yield.

Secretary UDALL. Congressman, without discussing area redevelopment and getting into any other hot subjects with you, this area of the conservation problem is one, I think, of necessity, talking about water research, where scientists are dealing with a problem, where scientifically trained people are going to manage it, operate it, and work together. And this is one thing that gets us away I think from many of the implications you have been talking about.

But then you get down to the basic problem, and this is the question you and other members of this committee have every right to ask: Well, what assurance do we have that in the case of the Federal appropriations being made to different departments and agencies, this research money is being well spent? And if I were on this committee, this is the same question that would be in my mind.

I should simply like to say that I think there could be better coordination within the Federal Government. I think we have been moving toward it. I think President Eisenhower's appointment of a science adviser, President Kennedy's continuation of this and enlargement of it, is all in the right direction, because scientific programs have to be coordinated. Otherwise, you are not going to get your money's worth.

There are still some problems, still some types of coordination that I would like to see come into existence. And I think if this committee gives its direction, we can do this coordination.

I think perhaps Dr. Wiesner's Office of Science and Technology is the proper focus for this overall coordination.

But I would think today, if you were to ask me, as far as the Federal money is concerned—because we are short-handed in this field—the areas of overlap are on the order, probably, of 5 to 10 percent, and not any larger than that.

I have said this earlier to the committee, and I think we can eliminate these with a little better coordination.

Mr. SAYLOR. Mr. Secretary, does the Department of Interior intend to set up guidelines and criteria for the universities which they will use in their research centers?

Secretary UDALL. Well, the legislation attempts to set standards, or set guidelines down. Whether they are adequate in the opinion of the

committee is of course a matter for the committee's consideration, but I think that we should do that. We want this to be a scientific and engineering program that is run on that basis.

Mr. SAYLOR. The reason I ask that: The Bureau of the Budget has some questions with regard to this facet, and I am wondering whether or not some additional amendments might be necessary in order to make sure that this program is properly carried out.

Secretary UDALL. This is an area where I certainly think I should defer to the committee's judgment.

Mr. SAYLOR. I think it is conceded that money has been wasted, in the sense that there has been duplication in the name of research. But do you think there has been duplication because the standards that we have asked for basic research are not high enough?

Secretary UDALL. Well, I think that the duplication in research relates in the main to the fact that there are areas where the right hand does not know what the left hand is doing.

The one area that is particularly of concern, in my own Department right now—let me give you a specific—one of the newer programs, and it is a sound program, and I am all for it—is the water pollution control program, in the Department of Health, Education, and Welfare.

It is a new program they are getting underway. It involves the problem of water quality, primarily. Of course, the Geological Survey in my own Department have been working on the problem of water quality for many years.

And here you have two agencies that have in a limited sense the same mission. The HEW aspect is particularly related to the health problem, to the pollution abatement problem. The Geological Survey's mission is the larger one. But there is an area that has to be coordinated, and we are, I think, moving toward coordination. If we do not, we are going to find some overlaps, and they may be much too big.

Mr. SAYLOR. Well, now, Mr. Secretary, do you believe that if we spend the money provided in title 1 of this bill, it will result in the universities and the States cutting back in the allocation which they are making for research in these fields?

Secretary UDALL. I do not think this committee ought to write legislation that would encourage or enable the States to do that.

I think we have got to have the right legislation that will get the States that are making an effort now, to make a bigger effort and those that are doing nothing, to get into the field. I think this is the basic purpose of the legislation. I hope the committee considers that in writing the legislation.

Mr. SAYLOR. Well, in view of the fact that section 100(a) of title 1 is for outright grants and subsection (b) of section 100 of title 1 calls for matching funds, in other than State universities or land-grant colleges, do you feel that there should be any restriction placed in this bill to make sure that in these two categories of institutions there is no duplication?

Secretary UDALL. Well, I think this might be a good point to make, yes.

Mr. SAYLOR. Now, one other thing, Mr. Secretary. I am delighted to see in the section 100 you have included Puerto Rico, because it

verifies what I have maintained for a long time, that they are not a strange and new creature, and they are an unincorporated territory. And I see that you have asked for them to qualify under an act entitled "An Act donating public lands to the several States and territories, * * * for the benefit of agriculture and the mechanical arts."

I will not ask you to comment on that specifically.

Mr. Secretary, one other facet that disturbs me with regard to the basic act under which you have asked these appropriations to be made: It has come to my attention that in one of the land-grant colleges, where agriculture has ceased to be the force that it was when the college was established, they had several of their faculty who were at the retirement age, and the president of the school was very anxious to expand several of his other departments, and he ran into a situation where despite the fact that there was actually little or no need for additional faculty in the agricultural end of his program, he was compelled to take men in that branch of his faculty.

Is this act intended to bolster those land-grant colleges where agriculture has ceased to be a predominant element of their society?

Secretary UDALL. Congressman, I know of the problem of which you speak, and I would hope that this might maybe redirect some energies and get some of the States that maybe do not have the agricultural research needs or problems they had 30 or 40 years ago interested in water problems, which I can assure you no matter where the States are located are going to be very abundant.

And I think, if I can make one final point, because I think that the Nation's space program is a very vital program, and I think this is a field we ought to be in: Basically, the whole thing from beginning to end is a research program, and a very vital one, but if we end up with hundreds of scientists who know all about space, and we end up short handed in terms of scientists who know about water, which we need on a day-to-day basis to survive and live a few years from now, I think this would be very poor planning from a conservation standpoint, very poor planning from a national standpoint.

Mr. BURTON. Will the gentleman yield to me for just an observation?

Mr. SAYLOR. Yes.

Mr. BURTON. When I had time, Mr. Saylor, I wanted to point out to the committee the fact that the Secretary's interpretation of the bill that is before us, introduced by the gentleman from New Mexico, is that the State could take this money and divert it to one or more institutions.

Is that not correct?

Secretary UDALL. That is correct, the money could be divided among several institutions if the State so desires.

Mr. SAYLOR. Now I yield to the gentleman from Oklahoma.

Mr. EDMONDSON. I thank the gentleman from Pennsylvania for yielding.

I have too high a regard for my colleagues in the House to let go unanswered the suggestion that some Members of the House may, in the exercise of very poor judgment, cast a vote against a major piece of national legislation under a misapprehension.

The gentleman from Pennsylvania has said that it was the grant of moneys to Oklahoma for recreation that led a number of votes to

be cast against the bill, and the record will bear out the fact that there is no project in Oklahoma that involves any grant in excess of \$1 million for that purpose, that the major portion of the funds that have gone to Oklahoma for development of a recreational complex on what is going to be the largest manmade lake in the Southwest, are loan funds, that are going to be repaid with interest, and they are going to produce direct employment of more than 500 men, and estimated indirect employment of an additional 1,500 men in the State of Oklahoma.

This presents a record in the provision of jobs, and the jobs that are good, solid, dependable jobs, that compares very favorably with the return on investment of capital to private industry, and other Government projects, for that matter, and I am quite sure that the majority, the great majority, of the Members of the House are far too aware of the importance of recreation in the Nation's economy today, and the value of a job that takes people off relief rolls and puts them in the taxpayer status, to have cast a vote against that fine legislation on the basis of any misunderstanding as to the grant involved.

The fact of the matter is that the grant that is involved is under one-tenth the grant that is involved in a very worthwhile program which the gentleman from Pennsylvania champions, and which I join him in championing, to an outstanding coal company in his State of Pennsylvania, to carry on a program of coal research.

And if we get the return in jobs on that grant to that Pennsylvania coal company that even approaches the return in jobs that is going to be realized on that project in Oklahoma, I think it will be a great thing.

I am willing to gamble with the gentleman from Pennsylvania on his program, for his company, and for the investment which he represents, because I think it is a good investment.

And I am happy to observe that the gentleman from Pennsylvania was not among those misled individuals who cast his vote against the area redevelopment bill, but on the contrary voted for it, in the exercise of the good, sound judgment that he usually demonstrates on the floor of the House.

I thank the gentleman for yielding.

Mr. ROGERS. Do you have anything further, Mr. Secretary?

Secretary UDALL. I certainly do not want to get into this discussion.

Mr. ROGERS. That is the reason the Chair is asking the question. I did not know we were going to get into coal and relief and ARA, but anything can happen in this committee.

Secretary UDALL. I took my lumps with Congressman Morton yesterday, so I will rest today.

Mr. ROGERS. It is always a pleasure to have you, Mr. Secretary, and it is good to hear you.

I thank you for your presentation.

The subcommittee will stand adjourned, subject to the further call of the Chair.

(Whereupon, at 11:59 a.m., the subcommittee was adjourned, subject to the further call of the Chair.)

WATER RESOURCES RESEARCH CENTERS

MONDAY, JULY 22, 1963

HOUSE OF REPRESENTATIVES,
IRRIGATION AND RECLAMATION SUBCOMMITTEE
OF THE COMMITTEE ON INTERIOR AND INSULAR AFFAIRS,
Washington, D.C.

The subcommittee met at 9:50 a.m., pursuant to recess, in the committee room, Longworth House Office Building, Hon. Walter Rogers (chairman of the subcommittee) presiding.

Mr. ROGERS. The Subcommittee on Irrigation and Reclamation will come to order for further consideration of H.R. 2683 and related House bills and S. 2 which passed the Senate April 23, 1963.

We will continue to hear from Government witnesses.

Our first scheduled witness this morning is Mr. Eugene Weber, Deputy Director of Civil Works for Policy, Corps of Engineers, Department of the Army.

Mr. Weber, you are recognized.

STATEMENT OF EUGENE WEBER, DEPUTY DIRECTOR OF CIVIL WORKS FOR POLICY, CORPS OF ENGINEERS, DEPARTMENT OF THE ARMY

Mr. WEBER. Mr. Chairman and members of the committee, I have a prepared statement which I believe has been distributed to the committee. I will either read it or summarize it as you prefer.

Mr. ROGERS. It being as short as it is, it might be better to read it, Mr. Weber.

Mr. WEBER. Mr. Chairman and members of the committee, I am Eugene W. Weber, Deputy Director of Civil Works for Policy, in the Office of the Chief of Engineers, Department of the Army. I have been designated to present the views of the Department of the Army, in behalf of the Department of Defense, on S. 2, H.R. 2683, 2689, 4048, and 7234, an act and bills "to establish water resources research centers at land-grant colleges and State universities, to stimulate water research at other colleges, universities, and centers of competence, and to promote a more adequate national program of water research."

Title I of the proposed legislation would authorize appropriation of \$75,000 annually, increasing to \$100,000 in the third year, to each of the States to help finance a college- or university-wide water resources research institute or center. There would be authorized appropriation of an additional \$1 million, increasing to \$5 million in the fifth year, which the Secretary of the Interior would be authorized to use to match State or other non-Federal funds for specific water research projects at these institutes or centers.

Title II would authorize to be appropriated to the Secretary of the Interior \$5 million, increasing to \$10 million in the fifth year and annually thereafter, from which he would make grants or enter into contracts or make matching or other arrangements with educational institutions, private entities, or governmental agencies for research into water problems related to the Interior Department mission.

Title III of H.R. 2683, 2689, and 4048 would authorize the Secretary of the Interior to establish in the Department of the Interior a Water Resource Service for the purpose of administering programs authorized in the bills. The Senate, in passing S. 2, eliminated the pertinent sections providing for the establishment of a new agency within the Department of the Interior. H.R. 7234 is identical with S. 2 as passed by the Senate. Sections 301 of S. 2 and H.R. 2683, 2689, 4048, and 7234 state that nothing in the proposed legislation is intended nor shall be construed as giving the Secretary of the Interior any authority or surveillance over water resources research conducted by any other agency of the Federal Government.

The Department of the Army believes that an expansion of State research in the water field, supplementing and complementing the water research of the Federal agencies, would be desirable. Moreover, it is believed that an increase in the grants which the Federal Government now makes to the States to encourage research would be justified by the benefits which would accrue to the Nation as a whole. Hence the basic objective of S. 2, H.R. 2683, 2689, 4048, and 7234 has the full support of the Department of the Army, on behalf of the Department of Defense.

In February 1963, the President in transmitting to Congress the report of the Federal Council for Science and Technology's Task Group on Coordinated Water Resources Research, noted that the report represents an important step in the development of a program of coordinated water resources research recommended by the Senate Select Committee on National Water Resources. Based on the careful study of the Task Group on the need for legislation and other action to strengthen water resources research, the report concluded with several observations and recommendations that are pertinent to the legislation now being considered.

With respect to title II, the following statement from the Council's report is noted (pp. 211-212) :

If use is to be made of the full potential of the universities to support water resources research and graduate education in water related fields, it is necessary that all Federal agencies engaged in such research have legislative authority and adequate funds to make grants and contracts for research at universities. Such grants are needed both at universities which are the sites of the multi-disciplinary research centers referred to earlier, and at universities which may be centers of excellence in particular fields. Authority to make such grants exists in all the water research agencies except the Department of the Interior, although, as pointed out in chapter 6, special problems exist in the Departments of Agriculture and Commerce that prevent them from giving full expression to their authorities. Also, it would be desirable to clarify, where necessary, the existing general authorities in this area held by other agencies having responsibilities in water resources research, such as the Corps of Engineers.

It is the view of the task group that the Department of the Interior and the Corps of Engineers should be given explicit authority and the necessary funds to make grants to and contracts with educational institutions for the support of research related to their broad mission responsibilities in the field of water resources * * *

The Department of the Army subscribes to this view, and recommends that title II be amended to provide explicit authority to undertake extramural research through various types of arrangements, including research grants, not only for the Department of the Interior, but also for the Department of the Army and for any other water resources agencies which do not now have such explicit authority.

The report concludes, with respect to the mission-oriented extramural grant programs referred to in the paragraph above (p. 212):

The planning and administration of the extramural grant programs of the several departments should be coordinated through the proposed Coordinating Committee on Water Resources Research of the Federal Council for Science and Technology.

After discussing the desirability of establishing and supporting multidisciplinary water resources research centers in the universities, the report further concludes (p. 213):

The administrative responsibility should be vested in one agency which should seek appropriations for this purpose, but the grants should be made in consultation with the other agencies having substantive interests in the field of water resources, which should participate in the drawing up of rules and regulations and criteria for evaluation. Such consultation and coordination is as necessary could be accomplished through the proposed Coordinating Committee on Water Resources Research.

The Department of the Army concurs in these conclusions, and recommends that the desirability of such arrangements for coordination of Federal support of multidisciplinary water resources research centers and of mission-oriented extramural research be recognized in those sections of the proposed legislation calling upon the Secretary of the Interior to coordinate with other agencies on programs relating to the purposes of this legislation.

We appreciate this opportunity to testify in support of the basic purposes of this legislation and to suggest how these purposes might be more effectively accomplished.

Mr. ROGERS. Thank you, Mr. Weber, for your statement.

The Chair recognizes the gentleman from Colorado, Mr. Aspinall.

Mr. ASPINALL. Mr. Weber, as I understand your statement it is consistent with the statement that was made by your agency when you appeared before the other body, isn't that correct? The committee of the other body?

Mr. WEBER. Yes, sir.

Mr. ASPINALL. This is particularly true inasmuch as you took exception at that time to the creation of a coordinating agency in the Department of the Interior that would be given certain powers which it doesn't have at the present time.

Mr. WEBER. Yes, sir.

Mr. ASPINALL. Inasmuch as the other body apparently saw fit to take the position that what we are doing in this legislation is just creating a new program and we would leave all other programs as they are, the Department of Defense decided to go along. Is that correct?

Mr. WEBER. Essentially, yes, Mr. Aspinall, although if I may I might comment on that point.

Mr. ASPINALL. I would be glad to have you comment. I am just making a record, that is all.

Mr. WEBER. What you have said, Mr. Aspinall, is quite correct; however, I should add that we feel it important also that the Army's part of the water resources research effort be recognized in some appropriate way as it was, as you know, in the report of the Federal Council's committee.

Mr. ASPINALL. How are we going to recognize the problem which presently exists where we have water research programs in various agencies of the Government without any apparent coordination and at the same time recognize the fine work that has been done by the Corps of Engineers in its research operations, unless we do have a central clearing authority, or agency of some kind that has power to see whether or not there is duplication and power to see whether or not there is a dovetailing of the research activities that are provided by the authorizations and appropriations from Congress?

Mr. WEBER. I think we must have this coordination and, as our statement indicates, we believe that it is well worth the consideration of the committee to emphasize the need for this coordination, even to the point of strengthening the proposed legislation in this respect.

Mr. ASPINALL. Unless we set up authority in some particular agency do you think there is any chance at all to keep the various groups that are interested from coming up to Congress and asking for appropriations as their own desires seem to demand?

Mr. WEBER. No, sir; I would agree there should be definite arrangements within the executive branch to insure that this coordination is carried out.

Mr. ASPINALL. How much money is spent by the Department of Defense for water research activities at the present time?

Mr. WEBER. Currently it runs about \$5 million a year. I can furnish the exact figure for the record but it is on the order of \$5 million.

Mr. ASPINALL. We have the figures. You don't have to get them.

Now, what this bill purports to do is to establish in land-grant colleges or universities certain water research programs and then to provide for grants of money to not only finance them but also finance outside activities.

Let me ask you this: How does the Department of Defense think that it can get any benefits from a program that authorizes State universities to engage in activities additional to those already engaged in in this field? Where do you expect to get any benefit out of it?

Mr. WEBER. We expect to benefit from all research accomplished in the water field.

Mr. ASPINALL. How?

Mr. WEBER. First of all, that research which is basic and across the board in the water sciences generally will certainly be of benefit to us since our programs are concerned with many phases of water resource planning and development. Secondly, the basic research in water science generally will undoubtedly lead to increased knowledge that will be helpful for the specific aspects not only of our program but of the other agencies.

Mr. ASPINALL. Unless you have a clearing agency, how are you going to get the information?

Mr. WEBER. There will have to be a clearing agency, sir. There is no question about it.

Mr. ASPINALL. You don't have it at the present time?

Mr. WEBER. No.

Mr. ASPINALL. You have access to certain publications and so forth but insofar as being sure that you know what is going on is concerned, at the present time, you have no certainty?

Mr. WEBER. We have no formal agency and, as you know, we depend on the available sources of information. We do, however, work with the other agencies in an effort to keep abreast of each other's activities and sources of information and so on.

Mr. ASPINALL. Would you say that your liaison with other agencies at the present time is so well coordinated and regulated that you have the information at your fingertips as quickly as you should have it and as well prepared so that you are not bothered with duplication?

Mr. WEBER. In the direct programs we are involved in up to now I would say that we have very excellent arrangements. You, Mr. Chairman, may be aware of some. We coordinate regularly with the Bureau of Reclamation and the TVA on certain aspects of our respective mission-oriented research.

With respect to a level of activity as envisioned in the legislation before us. I would say that our present methods would need to be strengthened in some way to insure that we would be completely coordinated in our proposals, in our activities, and in our awareness of the results of the activities of the respective agencies.

Mr. ASPINALL. If this legislation is approved in the form that the other body sent it to us or in a form similar to that, we are likely to have at least 50 and perhaps 75 universities vying for some position in this program, are we not?

Mr. WEBER. Yes, sir.

Mr. ASPINALL. That means we will have the responsibility of seeing to it that they don't duplicate their efforts, that they are engaged in various phases of this water resources program.

Do you think in the experience that you have had that 75 universities with perhaps a like number of independent operators under contract working with the various agencies of Government can find sufficient individual projects on which to work in the water field?

Mr. WEBER. Yes, sir. I would think they can. To my knowledge we have in our own program, to say nothing of the programs of the other agencies, felt that there were many specific subjects that needed study urgently and the number of these subjects we have been able to incorporate in our program and see incorporated in the programs of the other agencies has not made too large a dent in what we consider to be the backlog of specific project research studies.

Mr. ASPINALL. Do you have any difficulty in recruiting qualified scientists in the water research field for your activities?

Mr. WEBER. Yes, sir, we do. There have been many measures taken in recent years to encourage qualified scientists to engage in activities in the water field and yet it still is difficult. We feel that the program itself of aiding the States and the universities of the States to study

these problems will help to produce additional talent, particularly at the graduate level. These research projects we feel should be carried out in such a way as to encourage graduate training in the water sciences.

Mr. ASPINALL. What you are saying is that if you start with a program in a university soon enough to train a young scientist in this particular field in the early years of his training that he more than likely will continue with this activity rather than get into a glamor research project of today or tomorrow; is that right?

Mr. WEBER. Yes, sir; that is right. This has been fundamental as a problem underlying our difficulties in getting qualified personnel. Both civil engineers particularly and water scientists specifically have been scarce because of the glamor of the other activities.

Mr. ASPINALL. One of the situations that has bothered me throughout all programs in which the Federal Government engages in research is the relationship between the numbers of personnel who are scientists as such and those who are administrators as well as the cost for each. Do you have the answer with you at the present time as to how many people are employed in the Army Engineers in this field who might be called administrators, seeing that the scientists behave themselves and that they get the material out, and how many are scientists, and the cost for those who are administrators as compared with the cost for those who are scientists?

Mr. WEBER. I have some information.

Mr. ASPINALL. If you do not have it accurately, could you get it for us?

Mr. WEBER. I think I can, yes. I will give you an idea now and then we will supply any specific further data that we have.

Our administrative cost for the main portion of our research effort runs to about 15 percent. These people are not isolated, solely engaged in administrative work or solely in research work. There is some administration all along the line in the effort by the scientists involved. But generally speaking in the main part of our program the administrative costs run about 15 percent. I will supply the specific information we have on this.

Mr. ASPINALL. Mr. Chairman, I would ask unanimous consent that the further information supplied in answer to the question be received and made a part of the record at this point.

Mr. ROGERS. Without objection, it is so ordered.

Mr. ASPINALL. Thank you very much.

(The information requested follows:)

In fiscal year 1962, the last year of record, the total cost of the Corps of Engineers civil works research program was \$2,250,000. Of this amount, \$101,000 was for salaries for 7 research administrators concerned with executive direction and management of this program, and \$874,000 was for salaries of 67 scientists and engineers. These figures represent ratios of research direction and management to actual research of about 1 to 8.7 in terms of costs and about 1 to 9.6 in terms of personnel. In addition to the costs for salaries of research directors, scientists, and engineers, the total expenditures for research program includes the costs of nonprofessional technicians, clerical personnel, custodial services, utilities, maintenance, and supplies and equipment. On an overall basis, there was one research scientist or engineer for each \$34,000, and one research director for each \$321,000 of total research cost.

Mr. ROGERS. Mr. Morris.

Mr. MORRIS. I have one question, Mr. Chairman.

Mr. Weber, I notice in your recommendations that you make for title II you feel that not only should the Department of the Interior have the authority to undertake its research under a contractual arrangement but the Department of the Army and all other Federal agencies which might desire this should have it. Won't that further complicate the problem of retrieval and coordination of information that the chairman of the full committee was asking you about?

Mr. WEBER. I don't think so necessarily, sir. Regardless of how the research is accomplished, whether it is accomplished under the program of one agency or another the coordinating arrangements should be such as to insure that all agencies are aware of who is doing what and of the results of the research.

Mr. MORRIS. You say you have a liaison or coordinating program at the present time among Federal agencies?

Mr. WEBER. Yes, sir.

Mr. MORRIS. How many Federal agencies are involved in water research at the present time?

Mr. WEBER. The principal Federal agencies, those with major programs directly related to water are the Department of the Interior, the Army Corps of Engineers, the Department of Health, Education, and Welfare, and the Department of Agriculture. Then there are several bureaus within those departments involved and in addition a number of agencies which do not have major interests in the coordinated water planning and development field but which certainly are interested in many phases of water. For example, the Navy with oceanography.

Mr. MORRIS. I was under the impression that the Atomic Energy Commission was also interested in this field.

Mr. WEBER. Yes, sir. For example, in the Federal Council on Science and Technology's coordinating activities in the past few years the Atomic Energy Commission has been represented.

Mr. MORRIS. How many States have research? Do you know how many States have research projects in water?

Mr. WEBER. No, sir. I am not familiar with the precise coverage.

Mr. MORRIS. Do you know how many universities and colleges at the present time do research projects in water?

Mr. WEBER. I can answer only from personal knowledge that there are—

Mr. MORRIS. No, no, no, I am not asking you to testify from personal knowledge. I am asking you to testify about this coordinating committee that keeps track of the retrieval of all this information and coordinates this research. This is what I am interested in.

Mr. WEBER. I am afraid I must answer that I do not know how many States or how many universities—

Mr. MORRIS. Would the coordinating committee have the information?

Mr. WEBER. I cannot say.

Mr. MORRIS. Are you a member of the coordinating committee?

Mr. WEBER. I have participated in the subcommittees of this group.

Mr. MORRIS. You have participated. What do you mean you have participated? Are you a member of this subcommittee or are you not?

Mr. WEBER. I am a member of the Natural Resources Committee of the Federal Council of Science and Technology.

Mr. MORRIS. Is there a committee that coordinates the research among the Government departments and conducts the liaison that you were speaking about?

Mr. WEBER. This is the committee that has in the past few years done some specific coordinating of the programs of the Federal agencies.

Mr. MORRIS. How many times has this committee met that you recall?

Mr. WEBER. Perhaps a dozen times during the past year and at a similar rate during the period of the past few years.

Mr. MORRIS. Does the committee keep minutes of the meetings? Does the committee make official minutes of the meetings?

Mr. WEBER. Yes, sir.

Mr. MORRIS. How many members are there on that committee?

Mr. WEBER. I don't recall offhand, sir. It is perhaps eight members. I can furnish a list of the committee members.

Mr. MORRIS. I would like to have you furnish a list of the committee members and also the dates on which the committee has met in the last 5 years, if it has been in existence that long.

Mr. WEBER. Yes, sir.

Mr. MORRIS. That is all, Mr. Chairman, at the present time.

Mr. ROGERS. Did you want that information included in the record, Mr. Morris?

Mr. MORRIS. Yes, sir.

Mr. ROGERS. Can you furnish that?

Mr. WEBER. Yes, sir.

Mr. ROGERS. Without objection, this information will be included in the record.

(The information requested follows:)

COMMITTEE ON NATURAL RESOURCES OF THE FEDERAL COUNCIL FOR SCIENCE AND TECHNOLOGY

A. MEMBERSHIP

Chairman: Roger Revelle, science adviser to the Secretary, Department of the Interior.

Members:

T. C. Byerly, Agricultural Research Service, Department of Agriculture.

Paul McDaniel, Atomic Energy Commisison.

Eugene W. Weber, Corps of Engineers, Department of the Army.

J. Herbert Hollomon, Assistant Secretary for Science and Technology, Department of Commerce.

Robert J. Anderson, Public Health Service, Department of Health, Education and Welfare.

William Benson, National Science Foundation.

Thomas B. Nolan, Geological Survey, Department of the Interior.

Frederick Holtzberg, consultant, Office of Science and Technology.

Observers:

Michael F. Brewer, Council of Economic Advisers.

Thomas C. O'Brien, Bureau of the Budget.

Secretary: William Thurston, Geological Survey, Department of the Interior.

B. DATES OF MEETINGS OF THE FULL COMMITTEE OR OF ITS SUBCOMMITTEES DEALING WITH WATER RESOURCES RESEARCH

*Full committee**Subcommittees*

March 28, 1961
 May 9-10, 1961
 June 8-9, 1961
 July 26-27, 1961
 September 27-28, 1961
 January 12-13, 1962
 January 30, 1962
 March 7, 1962
 April 4, 1962
 September 13, 1962
 October 5, 1962
 November 16, 1962
 December 6, 1962
 January 24, 1963

December 22, 1961
 January 2, 1962
 January 9, 1962
 January 16, 1962
 January 29, 1962
 April 6, 1962
 May 17, 1962
 September 12, 1962
 September 26, 1962
 October 3, 1962
 October 12-13, 1962
 November 2, 1962
 November 16, 1962
 November 26, 1962
 December 4, 1962
 December 6, 1962

Mr. HALEY. Mr. Chairman, may I ask a question here?

Mr. ROGERS. The Chair recognizes the gentleman from Florida.

Mr. HALEY. I notice in this bill, S. 2, section 301:

Nothing in the foregoing section nor in this Act is intended nor shall be construed as giving its Secretary or the Department of the Interior any authority or surveillance over water resources research conducted by any other agency of the Federal Government.

How are you going to afford any compliance in this matter so that you would be able to assemble this information?

Mr. ROGERS. Is the gentleman directing that question to the Chair or to Mr. Weber?

Mr. HALEY. Do you know, Mr. Weber, how you would be able to compel compliance with the terms of this bill where the Secretary has no authority to enforce the plan?

Mr. WEBER. That is a difficult question to comment on in any simple way.

In the first place, I am sure that it is not intended for the Secretary of the Interior to have authority to countermand the prescribed responsibilities or decisions made by other Secretaries in their respective programs. At the same time, there does need to be some way for all of the Secretaries and agencies to have water resources research responsibilities to be mutually obligated to work together to insure that there is no duplication, no overlap, no lack of effort, no lack of coordination of their respective activities.

Mr. ROGERS. Would the gentleman yield?

Mr. HALEY. Yes.

Mr. ROGERS. Isn't it the position of the Department of Defense that this provision is in the Senate bill with reference to existing program? That it was not the intention of this legislation to bring under the Secretary of the Interior any preauthorized or other activities of the departments?

Mr. WEBER. Yes, sir. I believe we construe this as it states, applying primarily to existing authorities and existing programs. Because, as the chairman has in mind, I am sure, the bill does place certain obligations on the Secretary of the Interior with respect to this program itself.

Mr. ASPINALL. Isn't what you are saying, Mr. Weber, simply that you are advocating that the cake have some frosting on it and you are not willing to have any of this frosting scraped off or taken care of except through the activities of each one of the agencies involved who just want another layer of frosting put on. Is that right?

Mr. WEBER. Though I wouldn't express it exactly that way—

Mr. ASPINALL. I wouldn't, either, if I were in your place.

Mr. WEBER. I believe there is a certain applicability to the analogy you draw.

Mr. HALEY. Now, Mr. Weber, you say you do not think it is the intention to interfere with any existing programs. That is probably all right but the creation of this agency it seems to me is something like putting a layer on top of a layer.

I think we should have these programs but I see nothing in this legislation to force anybody to turn in, so to speak, to some central agency the results of these studies. I just don't see it in this legislation.

Mr. ASPINALL. This doesn't create any agency. This simply says there shall be spent so much money in additional programs in the water research field and that certain authority shall be given to the Department of the Interior, and other agencies will be continued as they are with the understanding that they may have a clearinghouse in one or the other of the existing Executive coordinating committees, or some committee that the Executive may see fit to create later on without any authorization from this committee.

Mr. HALEY. If I understand the need for this, it will be some central place where somebody would know what other agencies were doing. Is that correct?

Mr. ASPINALL. That is right.

Mr. HALEY. And to assemble the data that may be necessary in one central place so that it will be available to everybody but I see nothing in here to force any agency to do that.

Mr. ASPINALL. Of course, I think the gentleman is correct. On the other hand, at the present time you do have a Resources Coordinating Committee set up by the President and you have an organization of scientists.

Mr. WEBER. The Office of Science and Technology.

Mr. ASPINALL. The Office of Science and Technology. Supposedly they could clear through that but there is no congressional mandate for those organizations.

Mr. HALEY. You have now a Committee that you spoke about a little while ago that is attempting to do this in some respects?

Mr. WEBER. Yes, sir.

Mr. HALEY. How then, Mr. Weber, is the present Committee being financed? Is it being financed by the various departments?

Mr. WEBER. It has no finances of its own, sir. The Committee consists of representatives of the agencies and their salaries and the costs they incur in working together are part of the costs of the agency programs of which they are a part. The answer is that it is being financed by the constituent agencies of the Committee.

Mr. HALEY. What kind of success have you had so far with the Committee in gathering information and assembling it and so forth?

Mr. WEBER. The efforts of the Committee have not been thus far

to gather information and assemble it and act as a central clearing-house. The effort has been to examine jointly the existing and proposed programs of the several constituent agencies and determine whether there are any duplications, overlaps, overemphasis, or omissions in the broad attack across the field of water research and to try to reach mutual conclusions as to how the respective programs of the agency should be amended to eliminate any overlaps or omissions that are discovered in this manner.

This has in the last year or two been reasonably successful in helping each agency understand where it stands, what it should do a little more and a little less of and so on and so forth.

Mr. HALEY. I see you state your department has been expending about \$5 million a year in this program.

Mr. WEBER. Yes, sir.

Mr. HALEY. This legislation, of course, authorizes \$1 million and increases each year another \$1 million until it reaches \$5 million a year. Is that correct?

Mr. WEBER. Yes, sir. Increases to \$5 million in the fifth year.

Mr. HALEY. Section 200, title II of the bill refers to \$10 million. Does that mean this program will cost \$15 million?

Mr. ROGERS. Will the gentleman yield?

Mr. HALEY. Yes.

Mr. ROGERS. The whole program is anticipated to cost \$20 million a year after it once gets to the fifth year, as the Chair understands it. That would be \$5 million and your \$100,000 grants to each of the States and \$5 million in title II—\$10 million in title II but \$5 million in the other, that 11(b). There are two grants or two provisions for expenditures in title I.

Mr. HALEY. Will this include any money used now by other agencies that are now engaged in water resource research?

Mr. WEBER. It could, although I have not attempted to make any estimate. The only way I could envision an answer to that question would be to say that as we proceed into the next several years we would all have to determine whether the research activities that would be taken up specifically as a result of this legislation specifically replace any of the activities that we have had in mind as accumulating because of our own ideas as to what needs to be done. It would seem reasonable to assume that many of the things that we, for example, in the Corps of Engineers had been hoping would be done will be done as a result of the encouragement and assistance offered by this legislation. That is part of the reason we favor this legislation because we believe these things need to be done. But I couldn't say without the benefit of what experience will be accumulated whether it will go to significantly reduce the programs of other agencies that are now underway. I would rather think in terms of the need for additional activity in this area, rather than reducing the effort of any agency in this area now.

Mr. HALEY. Do you have any idea of the overall expenditures of all departments of Government in this particular field?

Mr. WEBER. I don't have that figure on the tip of my tongue, sir, but I can supply it.

Mr. HALEY. Could you hazard a guess?

Mr. WEBER. If I had to guess right now I would think that the total activities classified as more or less directly related to water might

fall in the range of \$25 million or \$30 million a year. I am just guessing now because I don't have a firm recollection of this figure.

Mr. HALEY. I have before me, Mr. Weber, a summary of the 1963 program and the 1964 budget for water resources research. The 1963 program was a little over \$66 million. The proposed program for 1964 is \$76.5 million, approximately. Of course, I am sure this committee and the Congress itself should be a little bit worried about the tremendous number of programs dealing in this particular field. I have a list of them here consisting of three pages. It seems to me like what we should do in legislation of this kind is to try to pull these things together. Apparently this is what this legislation is primarily proposed to do but I still get back to the proposition that nobody has the authority to demand cooperation and I just don't see how you are going to pull these various programs together under this proposed legislation. It would appear you are setting up a more or less volunteer thing here. In your department you can tell the Secretary, "This is what we propose to do."

It seems to me like this legislation from the other body is rather loosely drawn. Of course, I am no attorney but I am able to read these reports. I would love to see a program so every department of the Government will have some central place where you can find out what the various departments are doing. I don't believe this legislation we have before us will accomplish that unless some authority is put in there to enforce compliance.

Mr. WEBER. I think our estimate, Mr. Haley, is that our statement offers a comment on the point you just make in the sense that we believe it would be desirable for this legislation to recognize a little more specifically the need for coordination and specifically of the type that was recommended by the task force of the Federal Council for Science and Technology which acknowledges the possible role of the Executive Office of the President and the Office of Science and Technology in coordinating the activities of the several agencies. This is where we in the Department of the Army feel there should be responsibility to bring the activities of the agencies together.

We have suggested this specifically in our report that the committee consider strengthening the legislation in this respect.

Mr. HALEY. Of course, this table shows that the Departments of Agriculture, Commerce, Defense, HEW, Interior, AEC, NSF, TVA, and all of them are participating in this water research. It seems to me, knowing the bureaucracy and the way it works I don't imagine half of them know what the other half is doing and probably care less.

That is all, Mr. Chairman.

Mr. ROGERS. Mr. Weber, the Department of the Army is that portion of the Department of Defense that does the water research for the Department of Defense, is it not?

Mr. WEBER. Yes, sir. All of the water research directly related to water resources planning and development is done by the Corps of Engineers of the Department of the Army.

Mr. ROGERS. Now, Mr. Weber, what type of water resource does the Corps of Engineers work with? Could you give us a brief breakdown on that?

Mr. WEBER. Yes, sir. Our research is mission oriented as contrasted to basic. We do certain research related to beach erosion problems

for which we have responsibilities. We do certain research in hydrology particularly as directly related to our mission of flood control and water resources development and as contrasted to the basic research in water and hydrology that, for example, falls largely on the Geological Survey in the Department of the Interior. Then a large portion of our program of research is related directly to the engineering aspects of water resources development. That is the structural problems, the electrical and the mechanical problems that go with the equipment in the projects we develop for power, or gates used in flood control. We do research in soil mechanics and concrete which, of course, are a very important part of the construction of dams. We are also doing research work of the nonengineering type in improving plan formulation and evaluation of projects, that we propose to Congress.

Another part of our program which is rather unique is research in the use of nuclear explosives for large-scale excavation purposes. There are items such as aquatic plant control which has interest from a navigation standpoint as well as the water carrying capacity of channels. In more recent times it has gained a significance with respect to the quality of water which is a factor both for the use of our projects for recreation, for example, as well as the effect of our projects on the streams below. Similarly, we have research especially designed to increase our knowledge about the floating plant, the dredges, and workboats that go with the construction and maintenance and operation of our project.

I think this is a typical rundown of some significant items.

Mr. ROGERS. Do you do any work on available supplies, any research on available supplies of water?

Mr. WEBER. No, sir; not in a general way. We could be involved in the specific supplies in any given case.

Mr. ROGERS. On a particular project?

Mr. WEBER. Yes, sir.

Mr. ROGERS. Do you do any research at all on the legal problems involved?

Mr. WEBER. I am not aware we have done any research from a legal standpoint.

Mr. ROGERS. In this particular legislation, Mr. Weber, how, in your opinion, would it affect the present programs that you have outlined of the Department of the Army?

Mr. WEBER. In general we do not feel it would have any effect on the present program of the Department of the Army except possibly that time would indicate what should be included in future programs. Under the proposed program of this legislation, there might be proposed by the universities specific research projects which could have a direct relation to the mission-oriented research program of the Corps of Engineers. This is why we feel that coordination of the proposals made under this proposed legislation is essential in order not only that there be no duplication between what we would do and what would be done under this program but also that we would be able to benefit from by being aware of it and, in fact, in order that we might have some opportunity to help shape the nature of the work proposed to be done since we would want to be sure that it did in fact contribute to the needs of our mission.

Mr. ROGERS. This legislation, insofar as this program is concerned, covers everything, does it not? Is it your view that there is no possible research program with relation to water and indirectly affected by water which could not come in as an eligible insofar as participating in the grants or loans available under this bill?

Mr. WEBER. That is our view, that this legislation is broad enough to cover any conceivable aspect pertinent to water.

Mr. ROGERS. Of course, Mr. Weber, we are all very interested in the lack of duplication. As the matter stands presently, I have an idea there must be some duplication in research programs being conducted by the several departments at the present time. Would you think so?

Mr. WEBER. Yes, sir; there necessarily is some duplication and overlap.

Mr. ROGERS. Is there any agency at the present time, or is there any method at the present time, where a duplication which would be in the area of wasting money, let us say, could be caught quickly or might that go on for a year or two before it would be caught?

Mr. WEBER. I think there is very little evidence thus far, at least, that there is any serious duplication of effort which has not been almost a desirable doubling of effort, you might say, to attack various aspects of the water problem, but there is always this possibility, and this is one of the purposes of the coordinating efforts of the agencies—to eliminate any unnecessary overlap and duplication.

Mr. ROGERS. With the proviso in this bill of preventing the Department of the Interior or the Secretary from going back and getting jurisdiction of any existing water programs, it would then be the responsibility of the Secretary of the Interior, before approving any grants or making this money available, to determine in his own mind whether or not research in that particular field was being conducted by the Department of the Army, AEC, or any other agency. Is that right?

Mr. WEBER. Yes, sir; this is the way I interpret the legislation, to require him to do this.

Mr. ROGERS. I believe the Department of the Army indicated in its report to the Senate that it felt the research grants should be administered by the National Science Foundation and that the authority for water research coordination should be given to the Federal Council for Science and Technology.

Could you briefly outline the Department's position on that, Mr. Weber?

Mr. WEBER. Yes, sir; in commenting on the previous legislation the Department did, as you state, indicate its preference for having the title I grants issued by an agency such as the National Science Foundation because of the fact that there are several agencies in the Federal Government which have major responsibilities and needs in the field of water.

We felt that rather than any one of those major agencies having the responsibility across the board for basic research grants it would seem to us more appropriate that an agency such as the National Science Foundation be utilized for the purposes of title I.

However, it since has been our understanding that the Executive Office of the President and the National Science Foundation itself do not share the view which our Department held last year.

Therefore, our present position, which we have stated to this committee, is that, since it is essential that there be some agency designated to administer this, the only further comment we can make at this time is to indicate our serious concern that the coordination of the agencies be placed in such a way as to insure that it is not merely the judgment of one department as to whether this coordination is being accomplished or not but that it be accomplished through some mechanism which encompasses some authority over all the departments.

Mr. ROGERS. Your reference, then, to the two agencies to which you refer is simply because they were in existence?

Mr. WEBER. That is right.

Mr. ROGERS. You would have no objection if this matter were handled by reports to a congressional committee or the formation of a new agency to work out coordinating policies?

Mr. WEBER. In general, sir, we would feel it undesirable to create a new agency for this purpose.

Mr. ROGERS. I think Congress probably would, too.

Mr. WEBER. We certainly would feel that Congress would need and would want reports in an appropriate manner as to what is going on in this area.

I think I can sum up our view on this subject generally by saying we feel the existing machinery of the Office of Science and Technology and the Federal Council for Science and Technology, which has as constituent agencies all of the agencies interested in water resources, would be the most logical mechanism and combination of mechanisms to insure the highest possible level and mutuality of interest and jurisdiction without creating a new agency. That is why in our report we have recommended that the committee consider strengthening the intent of this legislation in this respect.

Mr. ROGERS. One further question, Mr. Weber. There has been some suggestion that there are not very many scientists or technologists in the various fields covered by this bill available.

What is the feeling of the Department of the Army with regard to those areas in water research in which you are engaged as to the availability of personnel to do a good job?

Mr. WEBER. We are aware, sir, of the scarcity of technical people who are qualified in this field of water as well as in many other technical areas.

However, we feel that there are many competent people available who are not now engaged in water research activity. We feel that the gradual carrying out of an increased program of research in water will in itself increase the number of people available for this work, particularly if, as I mentioned earlier, what I call the formula grant funds under title I to be used by every State for a designated university were applied specifically in such a way as to encourage graduate training in those universities. This would immediately begin to add to the manpower available for work in this area, not only in the research end but in the planning and development end.

Mr. ROGERS. Thank you very much, sir.

Any further questions?

Mr. MORTON. Mr. Weber, is your water research program primarily carried on at the facility at Vicksburg?

Mr. WEBER. Primarily, although we have contracts with universities and others.

Mr. MORTON. With how many universities have you contracts?

Mr. WEBER. I can furnish the exact number, sir, but I would estimate at the moment in any given year it might be with 10 to 15 different universities.

Mr. MORTON. They would be scattered pretty well throughout the country?

Mr. WEBER. Yes, sir.

Mr. MORTON. The chairman brought up a question as to the availability of personnel. That is what stimulated my asking this about Vicksburg. I have been very much impressed with the people and the facilities and everything else you have there. I wonder whether this coordinating agency should not be the Department of the Army itself because of the already existing facilities, the people involved, and the programs which you have had.

Have you expressed yourself here as to whether you think the Corps of Engineers itself should not be the coordinating agency to do this job outlined in title I?

Mr. WEBER. The Department last year expressed the view that no one of the several major agencies having a major interest in the field of water would be too logical an agency for this function and therefore expressed the preference as we did then for an overall agency, an agency which did not have part of the mission, so to speak.

On the other hand, we had never gone so far as to suggest that our role was such as to make us the logical agency for carrying out and administering the program.

By the same token, we do not feel there is much argument for selecting any one of the major agencies for this purpose. It makes it very difficult.

Therefore our current position is that recognizing there just has to be some administrative agency, some place to administer the program, we have accepted the proposals made thus far and have indicated our reliance on the coordinating mechanisms to insure that the interests of all agencies are properly taken care of.

Mr. MORTON. Is it a fact that most of the water resource research information which has been accumulated by various universities and other technical agencies and by the Corps of Engineers, that most of the results of that research is now in the possession of the corps?

Mr. WEBER. That is true to the extent that I believe the Corps of Engineers has available to it and is aware of the results of all water related research which would be pertinent to our mission; yes, sir.

Mr. MORTON. Thank you very much.

Mr. ROGERS. Thank you, Mr. Weber, for your testimony.

I think Mr. McFarland has a question.

Mr. McFARLAND. One matter which has not been brought up is the proposed amendment which the Army has suggested. This would bring into title II the Department of the Army. Title II would authorize appropriations to Interior up to \$10 million.

Do I understand that the Army's position is that there should be an additional \$10 million for this type of research grant under the authority of the Department of the Army?

Mr. WEBER. We did not consider the total amount which should be available to all agencies for this purpose.

We did feel, however, that each major water planning and development agency ought to have available to it explicit authority for making grants, but we did not consider specifically what monetary limit there would appropriately be on the authority of any of the agencies.

If the limit of \$10 million is an appropriate limit for the Department of the Interior, as specified in this proposed legislation, then it would seem to me that a similar amount would be an appropriate limit for an agency such as ours, since the program which we have in the Corps of Engineers for water planning and development of approximately a billion dollars a year currently is comparable, in fact somewhat larger, than the water-related activities of the Department of the Interior.

Mr. McFARLAND. Is there some question about grants for research at this time by the Department of the Army?

Mr. WEBER. There is some question; yes, sir. The Department of the Army has authority now available to it under general legislation which is applicable not only to the Army but to certain other agencies as well.

Perhaps you know, Mr. McFarland, of the one to which I refer. It is Public Law 85-934 of the 85th Congress. It gives authority to make grants for the conduct of basic scientific research to agencies which have authority to enter into contracts for basic scientific research.

It is clear we have authority to make grants but it is not clear whether it is authority to make grants but it is not clear whether it is authority to make grants for mission-oriented research as contrasted to basic research, for which the legislation was primarily drawn.

If it is the desire of the Congress to make it clear that they want water agencies to have explicit authority to make grants for mission-oriented research, we feel any action of the Congress which does purport and propose to go across the board on this subject of water resources, so to speak, rather than dealing with one agency possibly could rectify this doubt as to the authority for mission-oriented research grants for all agencies which are concerned.

I realize this poses a difficult problem for any one committee of the Congress and we do not wish to belabor the point. It is one we feel the committee should be aware of when they deal with whatever the committee feels is its part of the problem.

Mr. McFARLAND. That is all, Mr. Chairman.

Mr. ROGERS. Thank you very much, Mr. Weber, for your presentation and your answers to questions of the committee members.

Mr. WEBER. Thank you, Mr. Chairman.

It has been a pleasure to be here with you.

Mr. ROGERS. Our next witness this morning is Mr. James Quigley, Assistant Secretary of the Department of Health, Education, and Welfare.

Mr. Quigley is a former Member of the Congress from Pennsylvania.

Mr. Quigley, it is a pleasure to have you before the subcommittee.

STATEMENT OF MR. JAMES M. QUIGLEY, ASSISTANT SECRETARY OF THE DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

Mr. QUIGLEY. Mr. Chairman, it is a pleasure to be here this morning.

Mr. Chairman and members of the committee, I appreciate the opportunity to appear before your committee this morning to comment on S. 2 and H.R. 2683, 2689, and 4048 which are now before you for consideration. These bills would establish resource centers and in other ways promote a more adequate national program of water resources research.

The views of the Department of Health, Education, and Welfare on these measures are expressed in our report. In essence, our Department supports title III of the bills, but would place the function of establishing and maintaining a central catalog of water resources research, as described in the bills, in the Office of Science and Technology rather than with the Secretary of the Interior. Our Department supports title II of the bills and urges its enactment. It does not believe that title I is necessary to the legislation, if title II is enacted as written.

These views are based on our Department's very considerable experience in the conduct of research, including specifically research in the field of water pollution control. Under the Federal Water Pollution Control Act, research is carried on both in our own laboratories and extramurally through grants to universities, other institutions, and individuals.

Under the Federal Water Pollution Control Act, four different grant activities involving research are carried on—research grants, training grants, demonstration grants, and fellowships. In 1962, for all four programs, our Department expended approximately \$3.75 million, involving 218 separate grants and awards. These were made to 99 agencies, institutions, and individuals in 43 States and 1 foreign country, and gave full- or part-time training to 578 engineers and scientists.

Both in our water pollution program and in our much larger medical programs, our Department has found the grant technique to be highly effective. It provides for the widest possible participation by scientists. It can be administered as to supply stable support for university programs and yet maintain flexibility in the research approach. Perhaps most important of all, it invites very broad and creative approaches to whatever the research problem may be.

In every field of water research, this creative approach is going to be increasingly necessary in the years to come. Dr. Jerome Wiesner, the distinguished Director of the Office of Science and Technology recently set forth five general areas in the field of water management which demand increased scientific attention. These are—

1. The evaluation, prediction, and modification of the water cycle, considering precipitation, evaporation, and ground water flow;
2. Water in relation to land management, agricultural requirements, irrigation, and flood abatement;
3. Water resource development and control, storage, flood control, hydropower, and recreation;

4. Water quality, considering physical, chemical, and biological wastes and their disposal;

5. Water reuse and saline water conversion.

No single scientific discipline nor any one scientific or technical approach is competent to approach all of these problems. The grant technique, however, administered individually by the agencies concerned, can provide the flexibility needed. In our own area of water quality management, water reuse, and water pollution control we are involved in almost a full range of the scientific fields including many branches of physics, chemistry, and biology, mathematics, and the social sciences.

It is essential to the development of knowledge in the total field of water resources that the type of authority we now have to make grants, contracts, and other arrangements be available to the Department of the Interior. Title II of the bills you are considering would permit that Department to have access to scientific capabilities outside the Government for the conduct of studies related to their mission just as the Federal Water Pollution Control Act and the Public Health Service Act now provide that access to us.

Our statutory responsibilities in the field of water resources relate to water supply and pollution control and to health-related water problems. Our research grants are awarded on the basis of these areas of responsibility. Grants in the water supply area include studies of water resources and quality, and water treatment and distribution. In the pollution control area, studies range from waste collection and treatment to waste disposal and assimilation in streams. Conservation and microbiology studies include aspects of water, sewage, industrial wastes, and stream pollution. Theoretical and applied engineering, and analytical methods for measurement of water and sewage characteristics are included under engineering and analytical studies. Miscellaneous studies are those which cover multiple areas and the support of conferences and publications. Grants in these areas are awarded to projects which are designed with the specific interests of our agency in mind. There are areas of interest in water resources research for which grants are not now being made by our Department, because potential applicants, knowing of our interest and responsibilities, simply do not apply—and even if they did, their applications would either be rejected or given a low priority.

If, however, the Department of the Interior had its own program of support for extramural research, it could support projects of direct interest to its mission, and the results of those projects would not only be useful in direct relationship to Interior, but could have significance for programs of other agencies, including ours.

The grant approach has proven its validity; it enables an agency to utilize scientific talent wherever it may be; it encourages initiative on the part of researchers and institutions; and it permits a flexible approach to research problems that is not always possible in direct research operations.

It seems to me that this approach is preferable to the approach of title I of the bills, which would establish (primarily at land-grant institutions) research centers or institutes, without any consideration of the ability of the institutions to engage in productive research. While I understand the necessity for enlarging research potential in

the field of water resources, I do not believe that the establishment of 50-odd new centers will prove to be efficient or productive.

I very much doubt whether a sufficient number of qualified scientific people can be found to staff all of these new centers without seriously weakening existing research programs.

All of us engaged in water research are in competition with other scientific interests for manpower.

At the present time, the Department of Health, Education, and Welfare employs approximately 100 research scientists in its own in-house research programs in water pollution control. Approximately 170 other scientists are working in universities and other institutions in this field with the help of grants administered by the Department.

In the 1961 amendments to the Water Pollution Control Act, the Congress authorized the construction of seven new regional laboratories, to supplement the work now being carried on by the Robert A. Taft Sanitary Engineering Center in Cincinnati and to carry on other necessary research, demonstration, and training activities. These new laboratories are to be located in College, Alaska; Corvallis, Oreg.; Ada, Okla.; Athens, Ga.; Boston, Mass.; Ann Arbor, Mich.; and at a location in the Middle Atlantic States.

In addition to these seven regional laboratories and to the parent facility in Cincinnati, two other laboratories in the field of water quality have also been authorized by the Congress. One of these is to be in Duluth, Minn., and the other in Kingston, R.I.; both will be given the assignment of investigating problems of water quality and standards. The Duluth laboratory will be concerned with fresh water quality studies; the Kingston facility with salt water.

These nine new laboratories look forward to an inhouse scientific establishment which by the year 1968 will number some 500 full-time scientists working in the water pollution control field. In addition, we estimate that by the year 1968, an expanded grant program in the Department of Health, Education, and Welfare will involve some 400 other scientists working in this area outside the Government, in various universities and other research institutions.

This forecast of scientific manpower utilization is only one indication of the high priority which the Congress is giving to problems of water. It is a priority which in my opinion is well deserved; there are few problems involving the health and welfare of our people which are more urgent than the protection and development of our water resources. Certainly in the Department of Health, Education, and Welfare it is a problem which is concerning our ablest scientific and technical people. The objective of the bills which are being considered by your committee is very much in line with the national need.

Mr. Chairman, that is my statement; if there are any questions I shall do my best to attempt to answer them.

Mr. ROGERS. Thank you for your statement. It is nice to have you back on the Hill. I want to welcome you before the subcommittee.

The Chair recognizes the gentleman from Oklahoma, Mr. Edmondson.

Mr. EDMONDSON. I wish to welcome the distinguished Secretary before the committee. This has been a very thought-provoking state-

ment on this subject. I am pleased that the Department of Health, Education, and Welfare through its spokesman recognizes the very high priority which is needed in this field and I certainly share 100 percent the view that there is no resource where the need is greater at this time than in the research field.

One point which apparently has been paramount in the view of the Department in discouraging 50 centers has been the point that there could prove to be a lack of scientific manpower to man 50 centers.

It is not entirely likely that by locating these centers in each of the 50 States we could help this scientific manpower problem in the long-range operation of this program, even though I will concede that getting topflight people to start it might be difficult?

I think by locating these centers in a major university in each State that we would to a very considerable extent generate an interest in the field in each of these universities and help to manufacture some of the scientific personnel, help to generate the personnel by getting people to adopt careers in this field and to put their talents in this area.

Mr. QUIGLEY. Mr. Edmondson, I concede it is possible. Should this bill pass in the form it is now before this committee, I would certainly hope that that would be the result. We are in a vicious circle here, the chicken and the egg routine; which comes first. If you add more research activity, would this in turn beget the scientific personnel necessary to do the job?

We would hope that this would be the result. I think our views are somewhat influenced on this matter by the fact that we are now in the process of trying to build and shortly trying to man some nine water pollution research laboratories which the Congress has authorized already.

It may be we are a little too close to the problem. We are very conscious of the problems we face in not just putting up an impressive building with good research facilities but to get the best possible manpower we can to use these facilities effectively.

We are not saying we will not be able to do this but we recognize it is a challenge and it is an assignment.

I think the same thing would be true if the 50 water research centers or institutes proposed in the bill before you were established in all or most of the States. It would be a challenge to find the people.

I am not saying it would not be done, that it cannot be done; as a matter of fact, if the bill passes I certainly hope the results you say might flow will flow.

Mr. EDMONDSON. We have several institutions in my State which have faculty members who have won some distinction in this field, faculty members who have concentrated a good deal of their attention and their study to this problem.

I can see where there would be reluctance on the part of these men to leave the university to go to a Federal laboratory. I think you would be asking them to give up a number of things which are part of their way of life.

On the other hand, I can see where they would be much more readily interested in helping to build a research center located on the campus or close to the campus and as part of the university itself.

I think this is one of the advantages of this approach, that we will be able to appeal to scientists who are principally interested in pursuing scientific careers in a university environment and will enlist their talents and I hope enlist their recruiting talents, also, in order to get graduate students to devote their time and energy to this field.

Sharing your view there is no problem in our future which has any greater importance than our growth and the health of our people than having good water supplies and utilizing what we have, it seems to me this approach through the university is the best possible approach we can take to see that this problem is not neglected in any of the States, and it exists in practically all of the States.

Of course, as I understand the bill it does not require that this be done in any State. If the State does not want to go into it and cannot organize the talents within the State to command such a laboratory and center, there would be no obligation on the State to do it under this bill.

Mr. QUIGLEY. I agree with you 1,000 percent that the approach needed here is through the universities. I think we clearly recognize this under our great mechanism. We make most of our research grants to nonuniversity research institutions.

In establishing our regional laboratories, to which I made reference in the statement, an effort has been made to locate these laboratories on or very close to universities because we recognize, as you indicate, that there are many scientifically oriented people who are also university-oriented and that they want to stay on or near the campus with which they have been identified and around which they are building their careers.

Under our grant mechanism we emphasize and give the great bulk of our grants to the universities. In establishing our laboratories we are doing our best, though it is not possible in every instance, to locate them on or very close to university campuses.

I readily concede the point that a professor might not be interested in becoming an employee of the Government and would nevertheless be anxious to have the opportunity to conduct Government-supported research if he can do it and remain on his campus and in his role at the university.

The only note of caution I would throw out is this: If Congress passes this legislation which is now before this committee, it would be prudent and wise to look upon the effort proposed to be made under title I as seed money. Congress should not assume that merely because it has authorized the establishment of research centers in each of the 50 States that automatically our water resources problem is solved. Some of these centers will develop and grow quickly. Some will have a relatively slow growth. Perhaps some will never really get started.

I think it is important that what is proposed here be kept in perspective. The fact that we have nine regional water labs, and this bill would authorize 50 water research centers, does not automatically guarantee that the problem is under control.

I think everybody recognizes—I hope they do—that Congress has consistently demonstrated that it is very much aware of the challenge we face in the water resources field. Unless this country continues to

have an abundant supply of fresh, clean, usable water we are not going to continue to develop and grow economically.

As I say, the note I wish to strike is not one of "stop" but a note of "caution." If this Department of the Interior is authorized to proceed in the manner specified in title I, the present Secretary of the Interior, or his successor 3 years, 5 years, or 10 years from now should not be called to task if the record then shows that while a research center was authorized for each of the 50 States that in fact only 20 or 30 have developed.

This would not necessarily be bad. It could be good if those that are established are of a high caliber.

Mr. EDMONDSON. A further question on the subject of a location of the catalog. You propose that the Office of Science and Technology be the location of the catalog. To me it is not of too much importance where the facts are cataloged as it is that they be available and accessible to everyone and it would be a matter of convenience to the Government and the public that they be located properly.

What are the advantages of location with the Office of Science and Technology?

Mr. QUIGLEY. It seems to me that the big advantage of having it located with the Office of Science and Technology is that you do not have it in the Department of Health, Education, and Welfare, or that you do not have it in the Department of the Interior, you do not have it in the Department of the Army.

I don't think there is any question, as inferred from the chairman's earlier questions to General Weber, but that there is bound to be a certain amount of duplication in any effort as big and as important and where the approaches are as diversified as they are in this field. None of us are in favor of duplication. We want to eliminate it where we can, but this is a lot easier said than done.

We have one approach to this problem in our Department which I do not say is completely objective. We tend to think water pollution is perhaps the most important challenge in this area.

I am sure Interior would have an approach to water problems which would be its own and which would not be the same as ours.

I think the approach of the Corps of Engineers would be its own and would not be the same as Interior's or HEW's.

I think what is needed here is a general overview which would be as objective and as nondepartmentalized as it is possible.

It is our thought that of all the possible places where this might be located that Dr. Wiesner's office, by reason of its identification with the White House, by reason of the present role it is now performing in the broad field of Government research, that this might very well be the most appropriate place to locate the catalog called for in the bill. To me this would be far better than to say to Secretary Udall, or to the Secretary of the Army, or the Secretary of HEW, "You run your own program and at the same time keep an eye on everybody else's."

This is a pretty thankless and, I might say, almost impossible assignment to give to any Cabinet officer.

Mr. EDMONDSON. You are thinking of this catalog, are you not, as a warehouse of information more than anything else?

Mr. QUIGLEY. I am thinking of that, but I am also thinking of it in a broader sense. If the catalog shows duplication, if the catalog

shows, for example, that the Public Health Service is spending \$50,000 on a research project, I think that somebody can point this out to the Corps of Engineers or to the Department of the Interior when they propose to do something which is pretty much a duplication.

Mr. EDMONDSON. Could not the same arguments made on the subject of getting away from a departmental view or a parochial view on this question be made for locating this catalog in the Library of Congress?

Mr. QUIGLEY. I don't think so. I certainly think of this catalog, of this coordination function, as something more than an index that people may or may not refer to.

I think if it is going to achieve the purpose that I believe Congress and the administration has in mind that it be more than a record which is kept somewhere, but will become a meaningful document which demonstrates that department A is doing something and if department B proposes to do something which is pretty much a duplication it is not enough to highlight this fact and hope that department B will respond and say, "In that case we will desist." I believe that eventually somebody is going to have to say "Thou shalt not." Otherwise I am afraid that the tendency will be for department B to think of new and ingenious justifications for going ahead with their program.

Let me give you this example: The inevitable conflict which grows up between jurisdictions of the committees of Congress. I don't think the chairman of any committee is in the best position to make the final decision as to what should come to his committee and what should not go to another committee. I think eventually when these issues arise they have to be decided by the Speaker himself. The problem we face and the solution I am suggesting is, I believe, quite comparable.

Where we in our department have a program on which we want to move forward, and somebody points out the Department of the Interior and the Corps of Engineers has already done that, has already plowed that particular field of research, I think there is need for someone to say, with authority, "This is duplication and the proposed project should not go forward."

I really don't think the Secretary of the Interior or the Secretary of the Army or the Secretary of HEW or the secretary of any department is in a position to carry this thing through to the point where I believe it will have to be carried through in some instances if the duplication we are trying to avoid is avoided.

Mr. EDMONDSON. I certainly see merit in your proposal along that line. I am one of the late arrivals as an author of this proposal. In a sense I am seeing some loopholes in the bill.

Mr. QUIGLEY. I wouldn't think Dr. Wiesner would particularly welcome this assignment, but I think there is need for it. For someone to do the job and——

Mr. EDMONDSON. That is where we get over to——

Mr. QUIGLEY. He is my nominee.

Mr. EDMONDSON. We get over into another point I want to discuss. You are seeing this central catalog as kind of a working file for an administrative job and for a job of policing activity in this direction.

Aren't you creating an entirely new and different function for the Office of Science and Technology? You move him over from a job of more or less being a top scientific adviser and consultant to the President and to other agencies and put him in the spot of riding herd on these various research projects which are undertaken in this field by the different departments active in it.

Mr. QUIGLEY. I don't want to make a traffic cop out of him or to give him the assignment of riding herd on all the departments, but there is a need for such a person.

I think by the very nature of the proposal before the committee there is a general recognition that in an area as big and as important as this, where you have various departments approaching a problem from their particular point of view, that it would be a minor miracle if duplication did not crawl in.

Mr. EDMONDSON. A major miracle—not a minor miracle.

Mr. QUIGLEY. That is right. It seems to me the first thing we have to have is the fact. Is there duplication? If there is duplication what do we do about it?

If this bill were passed with the coordinating function in the Secretary of the Interior, and the Secretary of the Interior, or someone on his behalf, concludes that the research project being conducted by the Public Health Service in our Department is a duplication of a research project being conducted by the Corps of Engineers, I think the issue may be resolved.

The problem that comes up is when the Secretary of the Interior decides that one of the projects in our Department is a duplication of the work in his Department. This puts the Secretary of the Interior in an impossible position.

Mr. EDMONDSON. Are you thinking that an officer subordinate to, in the sense of his status in the Cabinet, to all these department heads will be able to tell these department heads you have to back up?

Mr. QUIGLEY. I frankly think if Dr. Wiesner were to say to our Department that in his judgment, or in the judgment of the people in his staff, who are basically all scientists and scientifically trained people, that in their scientific judgement project X being financed by our Department is pretty much a duplication of project Y being financed by Interior, that given the status and recognized ability of this man and the office he holds, its clear identification with the White House and not with any other Department, that there would be much more likelihood of the result we are all seeking being accomplished than if Stewart Udall and his Department made the same decision, or if Anthony Celebrezze and his Department made the same decision.

Mr. EDMONDSON. What is the present manpower of the Office of Science and Technology? Do you know?

Mr. QUIGLEY. It is not very large. Dr. Wiesner can answer that when he appears.

Mr. EDMONDSON. This bill provides that the initial assignment of the Secretary of the Interior would be to assemble this information and catalog it. In other words, it will take somebody with a good bit of manpower to do that job.

It provides after the catalog has been established, and the system established, that the President may transfer this function as he determines it to be desirable.

In other words, we are not trying to freeze it in the Department of the Interior but we are trying to utilize an agency which has the manpower to do the job now and thereafter to leave to the President the determination of where this future function will be performed.

I would have no objection to letting the President decide that question now so far as that goes, but I do think you will run into some problems.

As I understand the Office of Science and Technology as it presently exists, it is simply a scientific organization. You will have scientists down there doing cataloging and classification. I think you will make a very different type of operation out of it so far as the preparation of this catalog is concerned. This is to be done by Federal agencies and colleges, universities, private institutions, firms, and individuals. I think you are unloading a big burden——

Mr. QUIGLEY. I think this is a burdensome chore no matter who gets it. I am not so sure that the Office of Science and Technology is prepared to do it and I am not so sure the Department of the Interior is prepared to do it.

However, regardless of who gets this assignment, of necessity it will involve scientific competence. It will not be a mere administrative or ministerial or clerical task. Someone is going to have to review an awful lot of research projects, and to be a meaningful review these people will have to be knowledgeable and well-informed in a vast variety of scientific disciplines or we will wind up in worse shape than we are now. This is something that can't be done unless it is done by competent and qualified and well-trained people.

Mr. EDMONDSON. The more I hear about it the more I think it sounds like a Library of Congress job.

I note the one person singled out in the report of this task group for special mission for the assistance, and so on, in the study done by the task group on coordinated water resources research was Theodore Schad, Reference Service, Library of Congress. Perhaps we already have the agency.

Mr. QUIGLEY. I served on that task force and Mr. Schad did make an outstanding contribution.

Mr. EDMONDSON. We will have Dr. Wiesner up here this afternoon to see what he thinks about it.

Mr. QUIGLEY. I am not trying to put the monkey on his back.

In answer to your basic question—what is the chief argument for giving it to Dr. Wiesner—I think the chief argument for doing that is that you do not place the responsibility on any of the partisans, on any of the participating and competing agencies.

Mr. EDMONDSON. This argument exists if you put it in the Library of Congress, also, does it not?

Mr. QUIGLEY. That may be the answer; I cannot say.

However, if I seem to be arguing against giving it to the Secretary of the Interior, I would argue much stronger if the proposal were to give it to the Secretary of HEW.

Mr. EDMONDSON. You have opened up an interesting point.

Mr. ROGERS. Mr. Chenoweth?

Mr. CHENOWETH. I want to join in welcoming Mr. Quigley, our former colleague and an old friend.

Mr. QUIGLEY. Good to see you, Judge.

Mr. CHENOWETH. I had the great pleasure of serving with him on the House Science and Astronautics Committee. He exhibited a very keen insight into the problems facing our space program. I see that he is exerting the same influence in the Department of Health, Education, and Welfare.

I want to commend you, Mr. Quigley, on a very frank, forthright, and refreshing statement which you have submitted to this committee.

I get the impression from your observations that there is a good deal of competition in this matter of water research and perhaps we had better take a good look at the situation before we expand the program.

Mr. QUIGLEY. There is competition. There is competition for scientific manpower all over the lot.

Mr. CHENOWETH. You say you are hiring 100 research scientists now and 170 other scientists are working at universities and other institutions. You expect to have 500 full-time scientists in the field of water pollution and control shortly. Is that right?

Mr. QUIGLEY. Well, the laboratory—

Mr. CHENOWETH. You have raised a question in my mind concerning the need for an additional research program.

Mr. QUIGLEY. The laboratories have been authorized and two are already under construction and three more are in the planning stage.

Mr. CHENOWETH. What is the function of these laboratories to which you refer?

Mr. QUIGLEY. The theory behind the establishment of the regional laboratories was a recognition on the part of Congress that while we have water pollution problems all over the map they vary in kind. What is a water pollution problem in New Mexico, for example, would not be a water pollution problem in Pennsylvania, and what is a water pollution problem in Pennsylvania would not be in Oregon.

The thought was that by establishing these laboratories on a regional basis they would tend to concentrate on the water pollution problems which are particularly pressing in the areas where they are located. This is the theory.

In addition to the research being oriented to the problems of the area, it is hoped that these laboratories will be used to gather the necessary scientific data which the Department needs in connection with carrying out its enforcement responsibilities. If we have a pollution case in the Southeast, for example, it would be the personnel in our laboratory in Athens, Ga., who would be called upon.

As it is now we have to either pull some people off the bench here in Washington or away from the Taft Center in Cincinnati.

The thought is that by having people knowledgeable and informed and familiar with the pollution problems of an area they will be better able to bring together technical data needed for enforcement.

Mr. CHENOWETH. As I understand it, you do not favor the proposal in this bill to establish water research projects in the 50 land-grant colleges in this country?

Mr. QUIGLEY. It is not that I do not favor it, Judge. I raise the flag of caution that it may not be feasible or practical to establish a meaningful, productive and effective water resource research center in every one of the 50 States.

Mr. CHENOWETH. Your laboratories will primarily study the pollution problem.

Mr. QUIGLEY. The ones in our department are of necessity concerned with water pollution problems. That is our area of jurisdiction and interest.

Mr. CHENOWETH. Isn't it true that while that is their primary concern, they will also develop information on many other phases of water research? You can't divorce one field from the others. It would appear natural that they will study many other water problems in addition to pollution.

Mr. QUIGLEY. This is the kind of cataloging and coordination this bill seeks to get at.

Take the saline water conversion problem. The responsibility in this area rests in the Department of the Interior. I cannot help but believe that if the Department of the Interior is successful in its research efforts to convert fresh water from saline water that in the process, perhaps even before they achieve that goal, they are bound to have developed an awful lot of scientific information that can and will be useful to us who are concerned with the reuse of water. One of our aims is to take polluted water and process it so it can be potable and reusable.

Mr. CHENOWETH. Obviously, there will be some duplication between those two. It is obvious.

Mr. QUIGLEY. I think the challenge is to keep the duplication to a minimum, to let the right hand know what the left hand is doing as quickly and as often as possible.

Mr. CHENOWETH. I fully concur.

Mr. QUIGLEY. We will never achieve this perfectly but this is no reason why we shouldn't keep trying.

Mr. CHENOWETH. I want to again express my great pleasure in seeing you here today. It is always a great pleasure to have you before this committee, or any other committee of which I am a member.

Mr. QUIGLEY. Thank you very much.

Mr. ROGERS. Mr. Baring?

Mr. BARING. No questions.

Mr. ROGERS. Mr. Burton?

Mr. BURTON. I have no questions.

Mr. ROGERS. Mr. Morton?

Mr. MORTON. Just one question, sir. I think in line with the testimony of the gentleman from Oklahoma concerning the cataloging of information regarding this resource I think there is a question of definition here. My understanding of a catalog or a scientific catalog of research is more of a living thing than it is a set of files. It is where scientific work is coordinated and cataloged and made available to all people. There is a great deal of cross-pollination of research, as the judge just mentioned. Is this really what you are thinking about that this scientific effort must be going on continually and not just be an accumulation of data but the responsibility would be more of an interpretation of the data as well as accumulation of it?

Mr. QUIGLEY. Congressman, I think it has to mean that. If this is nothing more than a study and review that was made it will be accurate as of the day it was made but 6 months later so much can happen in so many of these fields that people will feel there is no reason

to check the files because they are so outdated. It has to be live and timely. It will never be perfect because the developments in some of these areas are too fast. There is a lag in reporting, unfortunately. This is one of the challenges we face in our Department. We seem to be able to spend much for research but we don't do anywhere as good a job in coordinating, publishing, and getting out the fruits of our research. There is a discouraging lag sometimes between what we learn and our ability to share it, even with people in the same field. These things occur in programs that involve our own departments. When you are dealing with sciences and scientists who are being financed by a grant activity or other activities in another Department—they could be financed even by another government sometimes—the challenge of coordination is far greater.

Mr. MORTON. Then finally the only part of this bill that you are enthusiastic for is title II?

Mr. QUIGLEY. This is the part we are really enthusiastic about and we are enthusiastic about it because the grant mechanism has worked so successfully for NIH, for the Public Health Service, and for our Department generally that we think we would be unfair if we didn't share this and didn't encourage all other departments who are involved in this type research activity to have this same authority.

Mr. MORTON. Won't you admit that the grant technique of handling broad research problems is directly proportional to your ability to interpret the data and put the various accomplishments of each grant together into a total research picture and that has to be done by some central agency?

Mr. QUIGLEY. This is one of the areas where I am afraid we are not doing as good a job as we are in getting the grants out, getting them started and approved. I think we are a little weak on the follow-up. I think there is an inevitable tendency to move on to the new project without the results of the last one being fully digested and promulgated.

Mr. MORTON. Again, this is an argument for this work being held in the Office of Science and Technology as opposed to any other individual department, not only for cataloging but for interpretation and cross-pollination?

Mr. QUIGLEY. Whether the Congress recognizes it or not I think the validity of what they are seeking here in water resources can be applied to the whole scientific effort of our Government. I recall my experience on the House Committee on Science and Astronautics and I have a terrible feeling NASA is duplicating many things the Defense Department is doing in many areas.

Mr. MORTON. I share that view.

Mr. QUIGLEY. I suppose this is inevitable when you have a program that is being moved with such force as the space program. There is bound to be some duplication. This doesn't bother me as such when it happens now and then, but I think there is a responsibility on the Congress and on the administration to reduce those instances to a minimum. This kind of cataloging, coordination or whatever you would want to call it, is needed in the water resources field, but I think it is needed in other fields where many branches and departments of Government are engaged in or subsidizing scientific research.

Mr. MORTON. Thank you, Mr. Chairman.

Mr. ROGERS. Mr. Martin?

Mr. MARTIN. Thank you, Mr. Chairman.

Mr. Secretary, I would like to join the Judge in expressing my appreciation for your forthright statement here this morning. Particularly, you pointed out some of the motivations behind the various departments. If I can paraphrase, the so-called puppy love relationship that many of them have to one another. I am curious about this, Mr. Secretary: Why should we gear this program strictly to the land-grant colleges? It has been my experience there is a great wealth of talent in the other universities as well. Is this a mechanical administrative problem or what is it?

Mr. QUIGLEY. I can't answer that. I don't mean to disparage the land-grant college. While I am not a product of one, I have several children who are now attending them. I think this bill as it passed the Senate does not, however, limit the research center activities to the land-grant colleges.

Mr. MARTIN. It will not?

Mr. QUIGLEY. It will not, as I understand it. It has been broadened so other centers could be selected within a State. I think this is a wise and prudent decision. I am sure you could go into any number of States where for a variety of reasons, such as the legislative appropriations, the personalities of the deans and professors, you might find a university that is not a land-grant college which has a rather outstanding effort today in water resources research.

It seems to me that it would be wise to build on that. It would be foolish not to do that and instead go to the land-grant institution in that State and start from scratch. I would think that a certain amount of flexibility should permit the Secretary of the Interior to encourage the work at centers where it will do the most good. I am willing to concede in many States the decision would be, whether written into the act of Congress or not, the land-grant college. But there could be States where the decision would be the other way and I think it would be wise for the Congress to give the Secretary a certain amount of leeway and discretion.

Mr. MARTIN. Our intent then should be specifically set out, should it not, so this program is not geared to exclude universities other than land-grant colleges?

Mr. QUIGLEY. I would think this would be a wise and appropriate provision.

Mr. MARTIN. One last question if I might: Do you feel it would be important from your experience in Congress to specifically set out in the statute wording to repose the authority outside of the departments that now exist with water programs and delegate to that authority the power to dictate to the various departments exactly what should be done? Should that be in the statute or should that be left to the discretion of the department who has the authority?

Mr. QUIGLEY. I don't know that you should try to set up a super-government which would try to dictate to all the departments. I think what is needed here is coordination—if I can use that word, though it is an unsatisfactory one. I think what needs to be done is a pointing out of duplication where it exists and that it be pointed

out by an administrator or Government official who (1) is at or near the top of the heap—meaning he is identified with the White House and not with any particular agency; (2) that his scientific judgment is not likely to be subject to challenge; and (3) when he makes that decision under those circumstances then I think that a Secretary of HEW and all the other agencies will say to the people at the lower level: "Look. This is the decision. It is made on valid scientific considerations. It is not political. It is not a matter of interdepartmental rivalry. It is *the* decision and I am going to abide by it."

I think if such a decision is made by another Cabinet officer or is made in the name of another Cabinet officer—frankly, it is not going to be made by the Cabinet officer; it would have to be delegated—if it is going to be made in the name of some other Cabinet officer, this makes the Secretary of HEW's position within his own Department far less desirable. If he can say, "This isn't Mr. Udall's decision, this is Dr. Wiesner's decision; this isn't a decision that was written by a staff man in the Department of the Interior, this was prepared after review by a group of independent scientists," I think this gives the Cabinet officer a great boost. If this decisionmaking is centered in the Secretary of the Army or the Secretary of the Interior or the Secretary of HEW or the Secretary of any department who is involved, I question that it will work.

Mr. MARTIN. Yes, but aren't you worried about what you are doing to the doctor when you cast him into this position without the specific authority that is written into the law itself so there may be no misunderstanding? As I see it you have to clothe him with the authority to back up his decisions or you are going to run into this administrative mess.

Mr. QUIGLEY. I really don't think so. Let me cite one example: In the water pollution control program the Congress recognized that our Department, when it was given the responsibility to go out and carry out enforcement actions involving States and municipalities and industry, that in many instances for a variety of reasons, good, bad, or indifferent, in many parts of our country the biggest polluters are Federal establishments. The President gave the HEW the responsibility of taking the lead in achieving corrective action. Now the Secretary of HEW has no authority to say to Secretary McNamara, "Look, knock out that pollution at that Air Force base," or he has no authority to say to the Secretary of the Interior, "Look, you have an Indian reservation that is fouling up the stream." He has no authority to do that.

Frankly, if our survey shows this to be the fact and the President has indicated that he recognizes that it is the responsibility of our Secretary and he wants other departments to cooperate, while he has no particular authority to bring any enforcement action against a Navy base or an Air Force base or some other department—a Federal prison—our persuasive position I would say, with the backing we are getting from the President, is adequate. At least it has been adequate so far. And I would think there is a comparable situation here with Dr. Wiesner or someone else—I don't want to, as I say, single him out but I can't think of anybody who comes closer to fitting

the qualifications and the standards that I have in mind, someone in his position if he could say, "This is duplication," I think steps could and would be taken in our Department to phase out that duplicating effort. We would proceed a lot quicker and with a lot more grace than if the order came from the Secretary of the Interior. I am afraid some of our staff people would say, "Well, this is a fight we have been having with them for the last 15 years. They don't want us in the field anyway."

Mr. MARTIN. Mr. Secretary, I don't mean to be unkind but the situations are not parallel. In the case of pollution each department knows they can seek our legal remedies immediately and get injunctions, mandatory or otherwise to enforce these rights and they know the Secretary of HEW has that authority to motivate that action.

In basic research which is what we are talking about here you haven't anything like that. Your man in whom you are reposing the authority has no concrete action which he can take.

Mr. ROGERS. The Chair must interrupt at this time. I was hoping we could finish. If any of the members would desire to question Mr. Quigley further there will be time in the morning, I think, Mr. Quigley, if you could come back up. We have only one witness scheduled. Would it be possible for you to come back? If any of the members desire further questioning could you come back?

Mr. MARTIN. I have no further questions, Mr. Chairman.

Mr. ROGERS. We will call you, Mr. Quigley, if we need you.

Mr. QUIGLEY. Mr. Chairman, I appreciate the opportunity to be here. If somebody feels I can contribute anything further I will be happy to come back.

Mr. ROGERS. Thank you for coming in.

Let the Chair make this observation before we adjourn. The Chair's heart has been very sad this morning and I am sure that applies to other members of the committee, due to the passing of our very able colleague and good friend Hjalmar Nygaard of North Dakota. Some of the members, of course, couldn't attend this morning because they have gone to North Dakota to attend the funeral of Mr. Nygaard, but I think before we adjourn today that proper tribute ought to be paid Mr. Nygaard. A resolution is being prepared for adoption by the full committee on Wednesday.

The Chair understands tribute will be paid to Mr. Nygaard on the floor today, so if any of you have anything to say in that regard, do so in the House.

The subcommittee will stand adjourned until 2:30.

AFTERNOON SESSION

Mr. ROGERS. The Subcommittee on Irrigation and Reclamation will come to order for further consideration of pending business, which is H.R. 2683 and related House bills and Senate bill 2.

This afternoon we are honored by the presence of Dr. Jerome B. Wiesner, Director, Office of Science and Technology.

Dr. Wiesner, it is nice to have you before the subcommittee and you may proceed.

**STATEMENT OF DR. JEROME B. WIESNER, DIRECTOR, OFFICE OF
SCIENCE AND TECHNOLOGY**

Dr. WIESNER. Mr. Chairman and members of the committee, I am pleased to appear before this committee to give my views on the proposed Water Resources Research Act. Let me emphasize that on the whole I welcome both the objectives and the overall approach of this important measure.

I believe that the water resources problems facing the Nation are of such scope and complexity that immediate steps are justified to broaden and strengthen research into the fundamental physical, biological, and social aspects of water resources; that such research should involve many intellectual disciplines and relate closely to problems of State and regional significance; and that expanded research in water problems must bear a close relationship to an improved and expanded educational base on which the effectiveness of such research will depend. Under intelligent and energetic administration, this proposed legislation opens the way to achieving these objectives. On several occasions within the past year I have had occasion to comment on S. 2 and its predecessors. I am gratified to note that the legislation now before this committee meets many of the suggestions made by members of the executive branch in regard to this bill.

It is also noteworthy that S. 2 reflects a fruitful partnership between the executive and legislative branches on a scientific matter of great importance to the Nation. Congressional initiative, effectively complementing the activities of the agencies and the Executive Office, has helped to establish the field of water resources as a problem of national concern, appraise the Nation's needs and capabilities, and work toward an appropriate legislative response.

This is also an area in which non-Federal efforts—especially those of the National Academy of Sciences, State and local government units, and the universities—have made valuable contributions. It is especially satisfying to see how constructively the elements of the Government and responsible private groups can pull together on a matter involving the application of science and technology to an important social problem.

The task of developing an appropriate Federal role in this area calls for an appreciation of the needs and capabilities of numerous elements of our society and will not cease with the passage of any single piece of legislation. Consequently, I look forward to continuing this pattern of cooperation in handling the issues of planning and development that may emerge from an expanded understanding of our national water problems.

One central theme has emerged from the studies of all these groups over the last 2 years. This theme is that, while the country as a whole is blessed with an abundance of water in nature, a careful national effort is now urgently required to combat mounting problems of the availability and quality of our water supplies. Unequal geographic distribution of water sources matched with a rapidly expanding population and an increasingly industrialized and urban economy have already begun to impose ceilings on the growth and progress of which our society is capable.

In comparison to other activities, the Nation as a whole is devoting a sizable portion of its GNP—more than \$10 billion annually—to the

problems of water control and management for human, agricultural, and industrial consumption, and the rate is rapidly increasing. In some parts of the country, the need for adequate water supplies has become a major regional concern, placing heavy demands on local revenue sources. But the surprising thing that our studies have indicated is that the long-range problems in this field are becoming increasingly national in scope.

The most recent study in this area, the report of the Federal Council for Science and Technology on Research and Development on Natural Resources, was recently transmitted to the Congress. A related task group report on Federal water resources activities, made available to Congress in February, inventoried the Government's programs and research needs and made recommendations reflected in many of the key provisions of the Senate-passed bill.

Looking ahead 50 years, the natural resources report predicts that, while the United States as a whole will not lack water, acute regional shortages could arise in large areas, in the Upper Missouri Basin, the southern Pacific region, the Gulf Coastal States, and even the eastern Great Lakes. The report puts the possible excess of demand over supply by the year 2000 as something close to 200 billion gallons a day during years of subnormal precipitation.

The report identifies the principal problem as water reuse and other means to reduce the consumptive use of water. It calls attention to the vast physical quantity of water that must be handled and controlled annually—some 1,000 to 10,000 times larger than the weight of fossil fuels, metals, and agricultural commodities that move in our economy—requiring expensive engineering works to regulate, transport, and distribute water to meet human needs. The report concludes, however, with a note that is common to the several excellent studies available to this committee, that—

There are great opportunities for improving the quantity, quality, and timing of useful water through a better understanding of natural phenomena such as interactions between vegetation, soils, and water * * *. Even slight improvements resulting from increased understanding of the behavior of water on and under the ground—

the report emphasizes—

can lead to large savings.

In spite of the scope of the developing need, Federal departments and agencies are currently sponsoring research at the rate of only \$53 million in fiscal year 1963, less than one-half of 1 percent of the Nation's annual expenditure for water facilities.

Our proposed research budget for fiscal year 1964 is of the order of \$67 million, with an additional \$9.5 million for facilities.

And yet even a small increment devoted to research aimed at better understanding of the many ways in which water enters man's environment could provide enormous economic benefits.

THE RESEARCH TASK

Science has a special potency in meeting resource problems. Insofar as scientific knowledge and ingenuity can lead to the development of technological substitutes to counter familiar shortages, wholly new opportunities can be opened up. By considering resources in the con-

text of systems rather than narrow categories, we can discover beneficial trade-offs not previously apparent. Successful research to produce cheaper energy, for example, would lower the costs of salt water conversion to permit its economic use to meet the needs of increased population and urbanization. I believe that we can be every bit as aggressive in bending technology to meet these problems as we are in meeting other threats to our national welfare.

The Federal Council Water Resources Task Group, in calling for an accelerating research effort to develop the knowledge essential to guide our expensive, continuing investments in public works, identified several key areas where additional research efforts are most needed—

- In the realm of basic research, greater understanding of the nature of water as a substance;

- Evaluation, prediction, and modification of the water cycle, including precipitation, evaporation, and ground water flow;

- The relationship of water to land management, considering agricultural, irrigation, and flood control practices;

- The systematic development and control of water resources, including problems of storage and transport, flood control, power, navigation, urban and industrial use, recreation, and wildlife;

- The problem of water quality, considering physical, chemical, and biological wastes and their disposal; and

- The reuse of water and separating processes, including saline conversion.

Yet these primarily technical considerations constitute only some of the factors that must be encompassed in meeting the Nation's needs for adequate water resources. In particular, the skills of economists and legal and institutional specialists are called for if the intertwined problems of water—problems of man's activities in relation to his physical environment—are to be understood and overcome. Although science can be especially useful in showing the way to practicable solutions, the development of greater understanding of the Nation's water resources problems will require a partnership of many disciplines and skills.

Another important factor in our approach to the Nation's water resources is the need to reflect both the needs and capabilities of regions and localities where awareness of the full scope of water problems is particularly strong. S. 2 wisely meets this need by emulating the pattern of a localized research base so successfully pioneered by the Nation's agricultural programs. Yet the extremely limited supply of specialists currently committed to the field of water resources strongly suggests that the pattern by which localized centers for water research will develop should prominently consider the availability of trained personnel. I am pleased that increased awareness of the need to have regard for this additional consideration is now reflected in section 100(a) of the Senate-passed bill.

Mr. Chairman, the executive branch is especially conscious of the relationship of the Nation's manpower pool and educational needs to the direction of our scientific programs. While we believe that the development of research centers under this bill must take into consideration the availability of personnel capable of engaging in high-quality research in water problems, we also see progress in university

research as an essential impetus to the training of additional manpower in this field. The significant contribution of this legislation is that it will enable students from the basic disciplines of physics, chemistry, biology, and engineering to apply their talents to work in water resources. Thus, we view the increase in university research that this legislation would authorize as a potential major contribution to education in the field, rather than an alternative or competitor to our interest in training more high-caliber personnel.

THE ADMINISTRATION'S APPROACH

The commitment of the administration to expanding our national effort in this field was emphasized in messages by President Kennedy to the Congress on natural resources in February 1961, and on conservation in February 1962. In the former message, the President stated that he was asking the National Academy of Sciences to undertake a broadly based and comprehensive study of the present state and future potential of research in the conservation, development, and use of national resources. At the same time, the President directed the Federal Council and myself to "review ongoing Federal research activities in the field of natural resources and to determine ways to strengthen the total Government research effort relating to natural resources." Within the context of this study, the Special Task Group on Coordinated Water Resources Research, under Dr. Roger Revelle, submitted its report to the Federal Council, which with minor qualifications endorsed the report.

That report is of special relevance today because of the guidelines it established for new legislation required to strengthen Federal programs in water resources research. Balanced consideration was given by the Task Group to the research, manpower, policy, and institutional implications of efforts to strengthen the contributions of universities to research and graduate education in water sciences. My position on the merits of the bill now before this committee reflects the detailed and careful conclusions of that Task Group.

1. All Federal agencies concerned with water resources should have the authority and the funds to make contracts and grants with any universities, whether or not they are the location of water research centers under this proposed measure, on grounds of the competence of the recipient to do work of interest to the agency and the impact of Federal support on the university's contribution in the field.

2. It is desirable to develop additional centers of water resources research in many universities and to strengthen existing centers and programs. Special emphasis should be given to bringing together scientists, engineers, social scientists, economists, lawyers, and others in the across-the-board attack on national needs. Such efforts should also develop so as to make the results of technical and interdisciplinary studies available to aid in the solution of local problems, and so as to involve contributions and influence the educational process at both the graduate and undergraduate level.

The character of Federal support for such centers should avoid excessive orientation of research to the mission of the particular Federal agency that provides financial support and should encourage research directed at State, regional, or national water resources problems. In

order to meet this objective, some Federal support to each center is required on a continuing and university-planned basis and should complement the extramural research grants program of the Federal agencies in support of their separate missions. S. 2 wisely recognizes that the organization of these research centers should be determined by the institution itself, since the objective should be to strengthen competence where it resides and to bring it into focus on water resources problems through arrangements that fit the organization and development plans of the educational institution.

3. Support to the water resources research centers should be in part on the basis of a relatively small formula amount, or "seed money," to a designated research institution to permit it to establish or strengthen its capacity for water resources research, and in part on a matching-fund basis for support of research at the center, giving careful consideration to the potential of the institution to conduct research of high quality. The Federal Council strongly expressed the view that the establishment of water resources research or analysis centers in the States with Federal grants should be on a permissive basis, under explicit qualification standards. I feel that legislation should emphasize the creation of such centers on a State or regional basis depending on the availability of qualified personnel and the desirability of establishing centers on a regional basis where cooperative effort among States would better utilize available personnel and more effectively bring them to bear on problems of mutual interest.

Consequently, I would also hope, that, where the Senate-passed bill includes provisions that would enable the States to locate their water resources centers at more than one institution within a State, any further fragmentation would be carefully scrutinized as to whether it would detract from the objective of efficient utilization of manpower and organization of research. It is my strong view that the Administrator of the grants program, the Secretary of the Interior, should have clear authority to decide whether or not Federal funds should be used, on the basis of the capabilities or potential of the research or analysis center to do high quality work.

4. Although new legislation should give to one agency the administrative responsibilities for carrying out the formula and grant programs, the legislation should in no way supersede authorities presently vested in other agencies to conduct extramural research in the colleges and universities. In the administration of matching grants for the conduct of research, the administrative agency seeking appropriations for this purpose should evaluate proposals for grants in close consultation with other agencies having substantive interest in the field of water resources. The other agencies, in turn, on the basis of their own unique experience should participate in the drawing up of rules and regulations and criteria for evaluation of research support.

I recognize the need from the standpoint of prudent management to designate a single executive agency such as the Department of Interior for the administration of a national program of the type envisaged in S. 2, but I am also aware of the historical and legislative development of the interests and missions of other major Federal departments and agencies in water resources research. The bill recognizes these coordinate interests of other agencies and would not place the Department of the Interior in a controlling position. However, I

would like to emphasize that in carrying out the provisions of this act with respect to the support of university-wide water resources research centers, the Department of the Interior should, in effect, serve as an agent in furthering the interests of all the agencies in their common objective of strengthening the water resources research capabilities of the Nation.

INTERAGENCY COORDINATION

Mr. Chairman, the task of coordinating Federal scientific programs is one area in which appreciable progress has recently been made in gaining understanding of basic problems and developing appropriate procedures. The need for coordination is to a great extent inherent in the processes of the decentralized structure of departments and agencies in the executive branch, each with legally defined responsibilities. This situation sets the priorities which coordination of scientific programs must observe—that each agency has the responsibility and flexibility to do those things that are necessary and appropriate to its objectives, and that the Executive Office of the President works to harmonize these interests where conflicts might develop or where important areas of Federal concern might receive improper emphasis.

A highly significant and essential basic step toward these goals was taken by the Federal Council's Water Research Task Group when it surveyed the work of the Federal agencies in the field and indicated appropriate areas for further research. The conclusions of that group, while emphasizing the importance of close interagency cooperation, pointed out an urgent need for more substantive work into water problems. Rather than indicating the existence of significantly overlapping and duplicated programs, the Task Group found to the contrary that not enough work is being done to meet the Nation's responsibilities for adequate quality water supplies.

Meanwhile, continuing leadership for interagency coordination and agreement on the national water resources research program is being provided through the Federal Council, established in 1959 to bring together policy-level scientific representatives of the major Federal agencies with scientific programs, and through the Office of Science and Technology. With the acceptance of Reorganization Plan No. 2 in the last session of the Congress, the OST was given responsibilities for assisting the President in the coordination of Federal science programs. Working closely with the Federal Council for Science and Technology, my Office provides the focal point for encouraging and bringing about such coordination, especially notable to date in the expanding fields of oceanography and atmospheric sciences, where similar selective emphasis has been called for to raise the quality and level of the national effort.

A coordinating committee on water resources research has been established under the Federal Council. We are in the process of appointing a leading authority in the field of water resources to the Office of Science and Technology, who will advise the Director and work actively with the Federal Council committee. The Federal Council, through the recommendations of its committee on water resources research, will make assignments of leadership responsibilities for given segments of the research effort to particular agencies. Especially significant criteria for this program will be that Federal activi-

ties must conserve and strengthen the supply of qualified scientists and engineers, and that sufficient strength in depth must be developed to serve the broad scope of national needs and interests in water resources. Meanwhile, the Office will continue the pattern of seeking out the best independent judgment by utilizing outstanding outside consultants for assistance in the overview of Federal programs.

The effectiveness of interagency coordination of research in water resources and of the management and conduct of agency research requires an adequate governmentwide scientific and technical information system to serve the needs of program administrators as well as working scientists and engineers. Although I am in sympathy with the objectives expressed in S. 2 to maintain a current catalog of water resources research and investigation projects of Federal agencies, I feel that it would not be wise to provide for this in legislation. Water resources research is but one of a number of important areas of research activity that require a current inventory of ongoing efforts. The Federal Council for Science and Technology has the matter of scientific and technical information, including this problem, under continuing study, and has recently taken steps to strengthen and extend the scope of the Science Information Exchange at the Smithsonian Institution. The SIE now has responsibility for maintaining an inventory of the current research of all Federal agencies in the physical and biological sciences and in engineering—hence including water research. This arrangement with its proximity of relevant disciplines would seem to make less obvious the need for the catalog suggested in S. 2.

In conclusion, I would like to emphasize the considerable importance of strengthening the in-house competence of Federal laboratories engaged in the conduct of water resources research. Although I recognize that the bill under consideration is directed at the support of research and related graduate training in educational institutions, we should keep in mind that in some areas of water resources research a major part of the scientific and technical competence in the field resides within the Federal research establishments. In this area, efforts to improve the conditions of creativity and to make professional careers in Government more attractive would be clearly in order. We must strive to upgrade the competence and level of effort in both the Government laboratories and the universities if we are to achieve the objectives of the bill to promote a more adequate national program of water research.

Mr. ROGERS. Thank you, Dr. Wiesner, for an excellent statement.

The Chair recognizes the gentleman from Oklahoma, Mr. Edmondson, for any questions he may have.

Mr. EDMONDSON. Thank you, Mr. Chairman.

I certainly want to compliment the Doctor for an outstanding, comprehensive statement which was to be expected after the outstanding report which was made by your task group and your counsel on this same subject.

This morning one of your colleagues in the administration volunteered the idea, which he said he hadn't discussed with you, that this proposal for a catalog of research projects was a very good proposal and that it should be a function of your Office of Science and

Technology. He felt you were the ideal agency to carry on a catalog of that type, that you were uniquely equipped with both talent and the mission to make it an effective thing. I would just like to hear your comments on that subject. The source of the idea was Mr. Quigley, the Assistant Secretary of Health, Education, and Welfare.

Dr. WIESNER. I thank him, but people are always volunteering jobs for us that they don't want to do, I guess. I think there are reasons why he and others might feel it should be in our office because we do stand somewhat aside from the various agency problems and inter-agency problems and we have to maintain some surveillance of all scientific activities in order to carry out our coordinating and evaluation task. The problem that is being discussed here is not a problem that is unique to water research. You can hardly name a field of research and development that isn't represented in almost all of the agencies in the Federal Government because of the varied missions of the agencies. So there is a need both for their sakes and for ours to provide rather comprehensive studies so we will have an understanding of the full range of activity in a particular field.

The Science Information Exchange has responsibility to maintain such a catalog for us. It is growing very rapidly.

In the life sciences they have a complete catalog. We have been trying for the last 2½ years to build up a background of information on research and development activities and we are making progress there. It is a different task to make sure that we have every single agency submitting to us every statement and every research activity that it is carrying on both outside the Government and inside and yet this is obviously necessary in order to provide a comprehensive review.

Because of the extensive activity that is necessary and because of our desire to keep our Office of Science and Technology a relatively small organization, I would prefer to continue to try to build up the Science Information Exchange effort which is done under contract for us by the Smithsonian Institution. At the moment the money is provided by a number of agencies in the Federal Government, HEW, Defense, Interior, and others.

In the future we will ask Congress for funds so that the Science Foundation can fund the entire operation, but the SIE will continue to have a steering committee of representatives from the various agencies that are involved.

This Science Information Exchange is only a small part of a very complicated and very difficult problem that we have been wrestling with, of the dissemination of scientific information in general. Data collection is one aspect that is very important for the good management of our scientific programs but equally important, of course, is getting the scientific information out to working scientists so that they have a good picture of what their colleagues around the country working in like fields are doing.

Mr. EDMONDSON. Do you feel the level of cooperation with the Science Information Exchange by the agencies, departments of Government in bringing to this Exchange the full facts about their different research contracts and projects at that level is satisfactory now?

Dr. WIESNER. No. I think it is getting better. I would say it was thoroughly unsatisfactory 2 years ago.

Mr. EDMONDSON. Do you think by encouragement along that line it would be helped—

Dr. WIESNER. If the bill would encourage us to do this under the present arrangement, it might be helpful. I don't know what would happen if the bill directed us to set up a separate organization because this would mean taking a small part of the activities out of the Science Information Exchange and putting it elsewhere.

Mr. EDMONDSON. From your own agency, you are declining the honor that is volunteered and you want to keep your agency small?

Dr. WIESNER. I would say relatively small.

Mr. EDMONDSON. You may be making Washington history here today.

Dr. WIESNER. I may not succeed here, either.

Mr. EDMONDSON. That is quite a departure from what is generally considered the format here with regard to Federal agencies.

Dr. WIESNER. I think there are so many things to do that if we tried to do them all at the White House level we would end up with an unmanageable activity. Many of you probably recall the big office that was set up in the Defense Department right after the war to try to manage scientific programs in very great detail. They had thousands of people involved, and they finally decided it was an impossible job. I fear if we tried to manage Federal science programs in that detail from the White House we would get a bureaucracy that would be completely unsatisfactory.

Mr. EDMONDSON. Doctor, was this information about the work of the Science Information Exchange at the Smithsonian Institution and the availability of that Exchange made a part of your presentation in the other body when you appeared over there on this bill?

Dr. WIESNER. We called it to their attention, yes. I don't know that I stressed it as much as I should have but we certainly have on several occasions suggested we prefer this route.

Mr. EDMONDSON. I have no further questions, Mr. Chairman.

Mr. ROGERS. Mr. Chenoweth?

Mr. CHENOWETH. You have presented a very illuminating statement, Doctor.

Do you feel we need more water research at this time? What is your main problem as far as water research is concerned?

Dr. WIESNER. As we look at the various commitments the country is making to provide additional water resources in various places we have seen many opportunities. I think our comprehensive task group report gives you many of them, and our report on research and development on natural resources also gives you more. It is always a hard question to answer but we see many places where we believe better understanding will make it possible to do things more efficiently and in less costly ways.

Mr. CHENOWETH. A great deal of time and money is now being spent on water research; is that correct?

Dr. WIESNER. That is correct. As a matter of fact, in one of our reports here we break it down and give you a rather detailed description of many of the things that are going on but we do believe there are many areas where inadequate work is being done. For

example, we believe that in the field of pollution control there are many——

Mr. CHENOWETH. Pollution control?

Dr. WIESNER. Yes. That is a new problem, for example, a problem that is very different from what it was a decade ago. One of the things that have been brought to our attention recently as a result of another study that we have made is the extent to which our rivers are being polluted by chemicals of various kinds, primarily from agriculture. We are going to have to take control measures. Experience in the other fields has indicated that more research and development should be done, the more of it we do on these problems the less expensive the measures that you have to take will be. On the one hand, I wouldn't like to give you the impression that I want to support all of the ongoing research at the present time—because we are going to make a study to see if there are things that are antiquated and are just being carried on because they were carried on for a long time. So there may be places for saving. On the other hand, we also believe that as time goes on and as our various water needs and pollution problems and quality problems proceed we would profit by spending more on research. On all of our water resource and development activities—Federal as well as State and local—we spend something on the order of \$10 billion a year. We are asking for slightly more than \$70 million next year in research and development.

Mr. CHENOWETH. You said million, not billion?

Dr. WIESNER. \$70 million for research in the water field; \$70 million is being asked for. Now, we have grown accustomed to seeing something like 2 percent of an area in the defense field or in industry spent on research and development activities. Whereas, it may be not completely logical to apply such a formula to a very different field like water research. We believe that by any standard that one can apply, this is a small amount of money for so extensive a field from a national point of view.

Mr. CHENOWETH. Doctor, we had the Assistant Secretary of HEW, Mr. Quigley, before us this morning. Mr. Quigley called the attention of the committee to the fact that they are building laboratories in different parts of the country. We have 8 or 10 of them and he said they now have 100 scientists on a full-time basis and that in a few years they expect to have 500 engaged in that work. Do you think there is a limit to this water research program beyond which there is a point of no return?

Dr. WIESNER. Yes, sir. Incidentally, I am not sure those particular establishments should be called research laboratories.

Mr. CHENOWETH. They are studying irrigation and pollution.

Dr. WIESNER. They are to deal with special problems of an area and they are really engineering laboratories to help the areas apply the results of the research to the problems of the area. Unless we are doing the research to help those——

Mr. CHENOWETH. I think research work is being done.

Dr. WIESNER. I think they are using the term "research" rather loosely when they apply it to these particular water control laboratories. There may be a small amount of research but I believe the principal objective of those laboratories will be the application of

scientific knowledge to existing problems. They are much more analagous to engineering facilities. I am pretty sure there would be only a minimum amount of research done in those organizations. Some of them fortunately will be located close to colleges or universities and I think in those cases you may find more research in those particular laboratories than the others. But the initial conception of the laboratories and of Mr. Quigley's purpose in carrying out the program, as I understand it—and I have spent a good deal of time talking with him about the program—will be to provide facilities upon which the areas can draw for detailed assistance when they get problems that are more complicated than their local people are able to handle.

Mr. CHENOWETH. Doctor, do I understand now that your attitude on this bill is that you would recommend some changes if this bill is to be passed?

Dr. WIESNER. I would recommend the change that I am suggesting in regard—

Mr. CHENOWETH. You made several suggestions.

Dr. WIESNER. I think two of my points are matters of interpretation of the bill's language rather than changes and you may want to make the interpretations certain.

I think the most important thing that we feel is that the Secretary of the Department of the Interior have the right to make some express judgments as to whether or not a proposal, a plan, is really going to be adequate and whether the people are likely to be available to support the plan, so that we don't end up with 50 institutions, 20 of which we all have to apologize for 10 years from now. I think that is really my concern and I think Mr. Quigley has a concern over it also.

Mr. CHENOWETH. Do you think 50 new research centers are needed in this country as proposed in this bill?

Dr. WIESNER. This bill makes 50 possible. It doesn't say we need 50. I think each State needs available to it some facility of this sort. This is why I indicate and the bill also makes possible regional groupings as being more desirable in all areas that have both small and variable technical manpower and small resources to finance it. So while it sets up an upper limit of 50, I don't believe it necessarily calls for 50. I think there are States that have both the resources and the need to have such institutions. There are other States that may feel they would like to start on the careful development of such an institution that they may not need as desperately as do other States for a decade or more.

Mr. CHENOWETH. Isn't it true that some States are now doing some of this work?

Dr. WIESNER. That is right. I believe the point the bill is getting toward, and that our group was interested in, is strengthening basic research activities, which are best done at universities and I think most importantly provide a way of attracting young people into the field.

One of the things we see more and more is that manpower goes where research interests are. The young man is attracted into some research activity when he is in the university and he does his master's degree and possibly his doctor's degree in a field. Chances are very good that that is the field he will follow all his life. So if we have a lot of defense work, space work, and medical research and no work

in the school in water resources, the water resources field is always doomed to be as ill supplied with people as it is today. And so the principal objective here is to provide a means of training people so that this field, which many of us regard as one of the most important over the next 50 years, will receive some of the country's able young people.

Mr. CHENOWETH. Thank you very much, Dr. Wiesner.

Mr. ROGERS. Mr. Baring?

Mr. BARING. Doctor, what is your title, is it M.D.?

Dr. WIESNER. No, it is Ph. D.

Mr. BARING. I probably should have asked the last witness from HEW, but I have been carrying on a running battle with HEW for several years now and I didn't want to ask them because I am afraid I would get the same type of answer I have received through the mails. In the treatment of this water out West we know there is a terrific need. We want water and we need it. HEW has had a program of fluorinating our water supplies. In fact they have even gone into the military and put it out through the Air Force and the Army so that their camps are all fluorinated too. Is there any danger of any part of this program going into fluoridation of water? I have had some 5,000 letters from across the Nation protesting fluoridation.

Dr. WIESNER. I am talking only about research. I am not talking about operational programs. While some of this money could conceivably go into understanding the problems of fluoridation it would seem to me that you would welcome that because if there are scientific problems and there are good medical reasons for being concerned about fluoridation, research could bring them out.

To answer your question specifically, I don't know the program well enough to know whether or not there would be any of the money going into research on fluoridation but it would seem to me that is quite a separate issue from asking whether the money would be used to implement such programs. Since this is only a research program that we are discussing here, I think the answer would clearly be that none of this money will be used to institute programs. I honestly have not looked at this problem in sufficient detail to talk intelligently about it.

Mr. BARING. I have personally studied it for about 3 years now and I just want to get it in the record at this time. I don't think HEW is qualified to say whether we should have it or not, because there is a wide variance in doctors on the subject. If you have a center in these universities where they could go further into this subject, I would welcome that because I think the way it stands now the Delaney committee said they didn't know enough about it to advocate it, and that was in 1956, and yet HEW has gone ahead with its fluoridative program and I am very much concerned. Personally, I think if the thing needs more attention it should get it, but I don't think we should do it until such time as the entire technical and medical staff can agree. They are certainly not in agreement at this point.

Dr. WIESNER. I don't feel competent to comment.

Mr. BARING. I was wondering if you were an M.D. That is why I was going to ask you.

Mr. ROGERS. I think it would be generally accepted that this bill—that is the language in the Senate bill would create an open door

to where almost any conceivable bill with direct or indirect matter associated with water could be studied. Therefore, I know of no reason why the subject matter to which the gentleman addresses himself could not be included.

Dr. WIESNER. I think that is right, sir. That is what I meant to say, but I do want to distinguish between a research program and the operating programs of the agencies for which I have no responsibility.

Mr. BARING. I think, Mr. Chairman, we ought to make a point of that before the bill is drawn up.

Mr. ROGERS. I think the record clearly reflects that is the understanding of the subcommittee. As a matter of fact, I think there was some thought in the minds of some members of the subcommittee that perhaps the matter should be reined in a little; that some of this wide latitude provided in this bill for research we will say even in the legal field, going into conflicts of law, both State and Federal might be considered. There may be some limitation put on that.

Dr. WIESNER. I think one should leave the restrictions to the good judgment of the Secretary of the Interior, sir. You never can anticipate what the real problems will be in the future.

Mr. ROGERS. Mr. Skubitz?

Mr. SKUBITZ. Doctor, if I understood you correctly, you said you thought we should have more studies in the field of water pollution. In looking at this chart, I find that we have five agencies of Government now in this field. Do you think we need others?

Dr. WIESNER. I am not proposing we put other agencies in the field. I am talking about the scientific research that the agencies do.

Mr. SKUBITZ. Thank you.

Mr. ROGERS. Mr. Roberts?

Mr. ROBERTS. Thank you, Mr. Chairman.

Doctor, I appreciate your statement very much, and particularly am I impressed by your statement that this bill would approach it on a regional grouping basis and that you do approve of that, because certainly in each region we have a much different problem. In the area I am concerned with, we have plenty of water, but much of it is not potable because of salt water pollution from surface sources and sub-surface sources. I am glad you recommend the bill to us, along the regional line.

I appreciate very much your statement. That is all I have, Mr. Chairman.

Mr. ROGERS. Mr. Martin?

Mr. MARTIN. Thank you, Mr. Chairman.

Doctor, I am ignorant of the responsibilities that you do have in the office that you hold. What are they?

Dr. WIESNER. First of all, I am the President's Special Assistant for Science and Technology, and in this capacity I can help him with any specific thing that he wants help on, just as any staff man.

Secondly, I am now Director of the Office of Science and Technology. This is an office that was set up by Reorganization Plan No. 2 last year, which created an Office of Science and Technology in the Executive Office of the President for the purpose of evaluating and coordinating research and development programs of the Federal Government, advising the President on these problems, and also advising Congress, as I am doing at this moment.

Finally, there is an interagency group called the Federal Council for Science and Technology on which representatives of eight of the principal agencies of the Federal Government that are involved in scientific programs sit. I am Chairman of the Council, what we would call a subcabinet for science. Dr. Seaborg, the Chairman of the Atomic Energy Commission, sits on it. Dr. Brown, who is the Director of the Defense Development Research in Engineering, is a member. Dr. Holloman, Assistant Secretary of Commerce for Research and Development, is a member. Generally, the highest standing scientific officers are members, and we deal with problems of science in the Government that cut across agency lines, such as science information which I mentioned earlier this afternoon, where the decision was taken to have the Science Information Exchange deal with all of technical areas and not only life sciences.

The Federal Council is a place where we consider interagency problems of all kinds, including water resources coordination. We have a panel of the council that deals with water resources, one that deals with natural resources and other groups.

We thus have these three structures: We have my office with a responsibility for continuing reconnaissance of Federal scientific activities. We have the Federal Council, where interagency program problems can be discussed and ironed out. Then finally I have the role of confidential Assistant to the President. These three mechanisms provide a possibility of doing the various things that have to be done in the White House with regard to scientific and engineering programs.

Mr. MARTIN. How often has this so-called sub-Cabinet agency met since your appointment?

Dr. WIESNER. Well, we try to hold the meetings down to one a month. Many times of the year we have two a month and sometimes three. The main group, as I say, meets one or two times a month but panels meet much more frequently and bring the results of their panel activities to the main group for final discussion.

Mr. MARTIN. Am I correct in stating this bill was predicated upon the concept that we need a crash program for water?

Dr. WIESNER. I don't think so. This certainly is not my view and I don't believe it is the view of the authors of the bill. We believe that we need to intensify our activities but we also believe that we are lucky at the moment that there is no real nationwide crisis in water. There are individual areas of the country that now have water problems but we also believe that the situation will change with passing time, with growing population and with growing industrialization. What we are suggesting is that we get on top of the problem by starting out with these activities now before there is a crisis that requires a crash program. This is not the point for a crash program.

Mr. MARTIN. Is there a sort of a helpless feeling among the agencies who are handling the water problems that they are not doing enough?

Dr. WIESNER. I would say there are several problems that the agencies feel. First of all, water research activities and water problems in general, in think, are growing fairly rapidly. For example, in the Department of Health, Education, and Welfare, programs are growing rapidly because pollution problems, as I said, are new problems, at least some of them. The problem of attracting enough good people to their research centers is already a difficult one. The De-

partment of Agriculture and the Department of the Interior are also finding increased demands for scientifically trained manpower for a field that doesn't have a means of generating its own manpower. So we have all of these reasons for becoming more acutely aware of the need for supporting additional basic research and for additional training of people with an interest and talent in this field. I think this is a response as I see it to both the need for growth in the national program and to the manpower problem that has existed for a long time and has now become sufficiently disturbing to require action of this sort.

Mr. MARTIN. Directing myself to the point that we have a two-pronged idea set forth here in the testimony. One, there are those who favor expansion of the Federal agencies and those who believe apparently that we have to go outside of trying to expand these agencies and take this grant approach to the colleges in order to attract men into the field. Now, which one do you prefer?

Dr. WIESNER. I think that in any important field you have to do both. That is, there are certain activities—the work of the Bureau of Reclamation, the U.S. Public Health Service, and the Corps of Engineers—which must be done in the Federal establishment. These agencies, as their programs change and grow and become more dependent on science, have to increase their scientific competence. But I also feel very strongly that they will never get that competence if the schools aren't doing basic research and training the people needed. So the two go together. This is not an either/or situation. I think if you look at any of the health programs, at military research and development, at the atomic energy program, you will see examples of how we have successfully carried out such two-pronged activity. Academic programs involve not only doing research, but bringing good faculty and good students into a field and making graduates available for private and Federal institutions as they become mature. I think there is little meaning to a good academic program if there isn't a need for the people. And also I think you need the academic program if you want to have a growing and strong science over the long pull. They are both important parts of a national program rather than competitors.

When you develop a program, of course, you are always forced to identify and choose between priorities, and you have to ask whether you can afford everything you are doing.

There are particular things that have a high priority in this field in the opinion of our panel which looked at the problem. I believe this was also the feeling of the congressional committees that have looked at this, that one of the great lacks in this field is skilled people, trained people who have come from institutions which have a continuing commitment to research and study in the water field.

Now, of course, there are exceptions. There are some good institutions working in this field both in the universities and in the Government, but they are very few. The whole purpose of this bill is to provide a broader base in the academic community for the water resources field, something which I believe is a very constructive move.

Mr. MARTIN. Does not the experience of the past show us that it is folly to assume you can attract and keep good men in Government? Generally speaking, is this not so?

Dr. WIESNER. I think we don't keep as many as we would like, but the water resources field is one where we have succeeded more than in most fields largely because there is very little industrial competition in this field. It is difficult to keep scientists and engineers in Government, and lawyers, too, I think, because we are not competitive with industry. We bring in good, young people and——

Mr. MARTIN. And we lose them.

Dr. WIESNER. We lose them all the time. This is something which is getting worse with each passing year as the Government's share of the responsibility becomes greater, and it is an increasingly serious problem. I myself believe some action to equalize Federal and non-Federal salaries and then to try to hold them in line is very vital. Otherwise the Government is merely wasting money. Once you get good people in the Government and they like the work, they stay. The Bureau of Standards attracts good young people, as does the Department of Defense, and the Government in general is competitive for the first 8 to 10 years of a good man's career. But there is a very severe flattening of the pay structure at the top. I am sure you are aware of this, too. There has been a lot of discussion about it.

Mr. MARTIN. This might not be a fair question, but I assume you favor the proposed salary increase for congressional Members?

Dr. WIESNER. I think it is vital. As a matter of fact, since you brought it up, I think if you were managers of industrial corporations—when I say “you” I mean Members of Congress—your stockholders would have the right to complain about the way you handle this whole pay situation.

Last year there was something like three-quarters of a billion dollars spent to fix up a pay structure at the bottom end. I suppose those people have more votes. For \$50 million you can straighten out the whole top end of the pay scale, including the Congress, judiciary, political appointee, and the top civil servant, and put them on a competitive basis. Somehow we don't do that.

I think this failing is very shortsighted.

A single badly managed program in the Defense Department or in the Space Agency can cost us tremendous amounts.

Mr. MARTIN. I think if we fight for that we will bring you on the floor.

Dr. WIESNER. I would be glad to appear.

Mr. MARTIN. You are a doctor of philosophy?

Dr. WIESNER. I am really a scientist-engineer. I got my training in radio physics.

Mr. MARTIN. How do people who are in these water programs get selected? They have been selected for some reason. I am interested in knowing how this is done.

Dr. WIESNER. People doing research?

Mr. MARTIN. Yes.

Dr. WIESNER. They select themselves largely. As I said earlier, young men get into the field largely by accident. A few people will turn up in a college knowing precisely what they want to do.

A few more will come knowing the general field they want to enter, for example.

I used to be at MIT before I came to the Government. Half the students who entered as freshmen said they wanted to go into physics,

math, chemistry, and knew where they were going. Half did not and would have to hunt for their field the first 2 years.

Actually, of the 50 percent who knew where they were going, about half of them changed before they were through. Most students may have a general idea of the area in which they are interested but not much more than that.

The interest of the subject, interest of the faculty, the opportunities for work in graduate school, for example, all influence the areas a student wants to enter.

Many people come into water research after they graduate from college, such as a man who is a chemist looking for a job to use his knowledge in that field.

Many geologists start with a general interest in geology and find specialization in water very interesting.

People who have grown up in the West have a natural interest because water is a continuing problem out there.

There is no single process by which people find their way into these things.

Mr. CHENOWETH. Do you think there is any foundation to the charge that NASA is pirating other Government agencies and taking all the available scientists, which will cause a shortage of scientists for other research programs?

Dr. WIESNER. I think there is some basis for this observation because there is some movement of people, but it is not pirating.

Some agencies do not have work as interesting as that of others. A man may find after 15 or 20 years that he would like another opportunity.

Many people find in spite of the salary problem that we have been talking about that the Government is a pretty decent employer and a good place to work, and they are not anxious to move out of Government employment.

After all, they have retirement benefits and many other things.

Mr. CHENOWETH. Do you think this situation presents a real danger or not?

Dr. WIESNER. I think there is a problem but not a danger. I think we are losing people from other agencies to NASA and these agencies have to work to attract them.

I think NASA is getting a large share of its people from outside the Government as well.

Mr. CHENOWETH. Do you think we are overemphasizing the space program to the detriment of others, for example, the water research program?

Dr. WIESNER. I would put it differently. We are emphasizing the space program and we have to emphasize other areas as well. That is what I plead.

I wouldn't want to cut back the space program but I want to be sure the things we need on earth, which we can also afford, are properly supported.

I don't believe it is a question——

Mr. CHENOWETH. Do you think there will be enough scientists to go around?

Dr. WIESNER. I think so. I am talking about training of scientists in the next decade or two. If adequate university facilities exist there are plenty of people to train. In other words, if people see

job opportunities and the academic institutions can carry the load there will be plenty of people.

There is an especially serious problem here because the postwar baby will be starting college soon. Not everybody who wants to go into science and engineering will be able to get into an institution in the next 2 or 3 years.

Mr. CHENOWETH. Thank you very much, doctor.

Mr. MARTIN. You are aware of the fact that in the Department of the Interior they have passed the phase when they regard reclamation as a local matter. It is national in scope. We now seem to be in a phase where they are regarding power as national in scope. You are aware of that?

Dr. WIESNER. I don't know what you mean about reclamation being of national scope. Reclamation problems are regional. They may be a problem for the country as a whole——

Mr. MARTIN. I speak passing from strictly the local level to the national level.

Dr. WIESNER. That is right so far as reclamation is concerned. I wouldn't characterize anything that I know of in the Department of the Interior as indicating they believe this is also the nature of the power industry.

There may be special areas where Federal assistance is desirable, particularly where they relate to reclamation and water control projects

On the whole I think it is the view of the Interior Department and the administration that industry is the primary source for power.

Mr. MARTIN. Why is it that you favor giving the Department of the Interior control over this new proposal? What really compelled you to state to this committee that they should have control rather than someone outside the Cabinet setup?

Dr. WIESNER. For the reason I indicated before. I don't believe we should centralize too many of these activities. The easy way to handle this problem, and many others, would be to say let us put it in my office or some new office of the executive.

I think that by this logic you could end up with all the Federal science programs centralized this way because they all cut across agencies. I believe that would be unhealthy. I think it would work to the detriment of the individual agencies if we try to man the programs from the White House. We would have poor quality people and people managing would be so busy they wouldn't know what they are doing.

Whenever possible I think the primary operating responsibilities should rest with an agency which has the major mission responsibility in the field. The Executive Office should maintain a kind of coordinating activity to avoid overlap and to be sure that the agencies know what they are doing, that programs are balanced, and that people speak to each other occasionally.

That philosophy about where this activity should go is the reason I said what I did.

It could have been in the defense agency, the Corps of Engineers, or in HEW. I think for the kinds of activities we are talking about the history of the Interior Department is a little more appropriate. This is an area where they have been strong and where the Bureau of

Reclamation does very good work and could benefit from these continuing associations with the universities in this work.

It could just as well be suggested that another agency do it and that agency could perhaps make a good defense. It is not a black-and-white situation.

Mr. MARTIN. Shouldn't this committee attempt to try to set up a separate Cabinet?

Dr. WIESNER. A department?

Mr. MARTIN. Yes.

Dr. WIESNER. To do research on water?

Mr. MARTIN. Yes. This is a very critical thing. It is certainly as critical as many of the other Cabinet departments, is it not?

Dr. WIESNER. We have no Cabinet department set up for support of research in any given area. If you were going to consider a Cabinet post you would have to consider taking all the water activities out of all the agencies and putting them into a new Department of Water Resources.

I think this would cause as many problems as it would solve.

Take the field of pollution control, for example. There is a relationship between water pollution and the work one does on air pollution and work one does on biological matters in HEW, for example. It is a fairly appropriate thing for water pollution responsibility to be in HEW because it is related to health problems.

On the other hand, I think many of the water problems which deal with having adequate water supply are related to the natural resources problems.

The Department of the Interior is the primary resource agency so there is a perfectly sensible reason for water research and water management problems of the kind we are dealing with to be in that Department.

If you set up a new agency and say this agency will have all responsibilities for water, you would have so many interagency coordinating problems you would be in trouble. The agency would have to do biological research to work on pollution control. Instead of being in a position where we were coordinating the water research we would have to coordinate the biological research.

I don't think you can get out of coordination problems by any new administrative structure.

This is not a unique problem. We have the same problem in oceanography where many agencies work together.

People ask why not set up an agency for that. You will find this occurring over and over again. If you try to set up a new department every time you confront a new national problem you would have to be reorganizing the Government continually.

As I say, I think even after the reorganization you would find you have a problem of missions of the agencies going across in one direction and scientific disciplines going down the other way.

Almost every agency has some interest in every scientific discipline. You can set up agencies according to scientific discipline and then you will have trouble coordinating in the other direction.

You can do it as we do now with certain mission responsibilities and then you will find each one having to do work in every scientific field.

Mr. MARTIN. You apparently believe in this idea of decentralization in this field whereas everything I have read would indicate you ought to have a centralized situation here to cope with this, and you would be the most ideal person we should cloak with authority to see to it that this program is coordinated. You seem very reticent.

Dr. WIESNER. I have the responsibility in my office to see it is coordinated, but I do not have the responsibility of running it all. I think that is a very different thing.

You want a White House coordination to make sure people deal with each other when there is an overlap and tension. And you want to be sure there are no bad omissions, which sometimes can be more serious.

I would not want to recommend that we create a Department of Science which many people have recommended, where you would take all the science out of all the agencies and put it in one department. It would be a very bad mistake for the reason I have given.

I think the missions of the individual agencies require research and development. If you pulled it all out they couldn't carry on their missions.

I base this on 25 years of seeing frustrations which come from the kind of thing I am trying to do now. What I am talking about is not easy.

I think we are making progress and I think our present efforts are the only solution. I don't believe you can do it all by reorganization of the Government.

There may be some things which can be done by reorganization. Perhaps 2 more years of trying to do this will show me what they are, but I think we can do this job without taking the essential substantive things out of the individual agencies.

Mr. MARTIN. What will you do with these land-grant colleges when you give them money? Who is going to decide what they should do?

Dr. WIESNER. Basically they themselves should decide what they want to do. In general, the faculties and the colleges in cooperation with the States in this instance, because these are State-planned activities, should decide what should be done. There will have to be a mixture of what the State thinks is important and interesting from the point of view of its problems and what the faculty is interested in working on.

Out of that interaction between the States and schools will come a plan, and the responsibility of the Secretary of the Interior will be to judge the plan. He should have in mind what the real problems in this field are so that he can exercise his judgment if some plan is completely esoteric and not sensible from the point of view of research in this field.

By and large in the support of academic institutions the practice always has been to support the research the institution wants to do if you regard the general area as important and respect the competence of the institution. I think that should be done here.

There are two parts to this program. There is basic research support on the initial grant which starts at \$75,000 a year and builds up to \$100,000 a year, and beyond that there is matching fund money for research. There the Government can exercise considerably more control and be sure it is research directed toward the problem in the area of interest to the Federal agency.

Mr. MARTIN. On page 3 of your statement you say your study shows the long-range problems are increasingly national in scope.

With the knowledge you have brought with you today would you say in the foreseeable future that the Federal Government will have to take an increasing portion of the responsibility in this field?

Dr. WIESNER. For the supplying of water or research?

Mr. MARTIN. I refer to all aspects.

Dr. WIESNER. I don't really know. I would think not. I think there are areas where it may be necessary; for example, in regions you know better than I where you need tremendous engineering works, where they involve many States and many objectives, more than just providing water. They involve power, flood control, and so on. The Federal Government may be the appropriate agency to provide coordination and funds there.

In areas of the country like the one I come from where we need more and more water but where it is a clearcut water problem, I see no reason why the Federal Government should step in.

In such areas as pollution control and health problems the Federal Government may have to cross State boundaries because of the nature of the problem. The kinds of chemicals used may be the responsibility of the Department of Agriculture and HEW.

In terms of providing leadership here I would think the Federal Government will have to play an increasing role.

As you look ahead and talk about solving water needs I wouldn't want to predict whether there will be need for Federal participation.

I think the Federal Government's primary responsibility will be to show how to do things rather than to do them. I could very well be wrong. I don't think any of us can predict what 50 years from now will bring about.

As the gentleman from Texas, Mr. Roberts, said, there are many parts of the country, such as his, where there is water available but it is not useful.

As we develop our capability of dealing with these problems, whether it will be possible to handle them on a State and local community basis or whether the Federal Government will have to help, I don't know. I don't think any one can at this stage.

Mr. MARTIN. From your experience in the past what about the problem of making sure that private universities get their fair share of this research? How would you advise us to handle that? Would you write something in the bill or leave it to discretion—

Dr. WIESNER. Leave it to the discretion of the States and Secretary. Private institutions have more flexibility, anyway, in moving into areas they think important. I don't believe this will work against the interest of the private institutions. I think States can use private institutions in their programs if they want to.

Many will tend to use the land-grant colleges because they have been more interested in this problem than private institutions, but many of the big schools, like Harvard, MIT, and Chicago, to name a few, have quite aggressive research programs in this field and may very well be interested.

Mr. MARTIN. I am concerned about this because I have been interested in some of the so-called power plays by land-grant colleges. You wouldn't state that there is no political motivation behind this at all. You wouldn't go that far, would you?

Dr. WIESNER. I wouldn't state the opposite, that there is. I just don't know. I am aware of the fact all these natural resource problems have special interests but I think this program is one which we believe to be sound just on its merits.

I came from a private institution. I presume when I retire from Government I will go back. I am not oblivious to their problems. I don't think this presents any special problem.

Mr. MARTIN. Thank you.

That is all I have, Mr. Chairman.

Mr. ROGERS. Mr. Morris?

Mr. MORRIS. I have no questions.

Mr. ROGERS. Mr. Burton?

Mr. BURTON. I would merely like to say to Dr. Wiesner that prior testimony before this committee on the subject has revealed that we have nine departments or major agencies engaged in water research of one type or another and 26 subdepartments and offices.

As you can perhaps tell, members of the committee are interested in seeing that this program is coordinated and perhaps even trying to tie the tin can to somebody's tail, so we have somebody we can hold responsible.

I was interested in your suggestion in response to the question of the gentleman from California about the Interior Department, that the Interior Department is the one you recommend should have this overseeing function?

Dr. WIESNER. In this particular area.

Mr. BURTON. I think some of us can see there might be some problems here.

I think Mr. Quigley brought that to our attention this morning.

Dr. WIESNER. I think other agencies have had some nervousness about this.

Mr. BURTON. In effect you are asking either the catcher or the pitcher to play the ball game and manage the team as well.

Dr. WIESNER. No, we are asking him to watch the bats, which is different. This is a very small part of the total water resource activity. We are not asking him to run all research. Programs will continue to operate in the various agencies. The Executive Office exercises a considerable amount of control, and the Bureau of the Budget is involved, so I believe this particular coordinating problem can be managed.

I think many of the agencies concerned about this thought this might be a step in the direction of giving total responsibility for water resources, research and management, to the Department of the Interior. You can see why they would be nervous about that.

That is not the intention of the executive department. It is our view that every time there is a job to be done, which involves several agencies, we should not bring it into the White House but make the tough decision of giving it to one of the agencies and trying to make it work there. Otherwise we would have a bag full of these problems, one every week.

Mr. BURTON. There is one item in this bill which gives me a little personal concern and that is in title I. What we will be doing after the first several years in effect is, unless there is limiting language put in here, giving each of the States and Puerto Rico \$100,000 a year in perpetuity. There is no check on what they are doing.

Of course, language of the bill states it shall be the duty of each of these to arrange for research, but there is really nothing to make them do it. They may put this money in their general fund. Congress or the Department of the Interior, unless there are strings attached, will not know whether we are getting \$10,000 worth of water research or \$90,000 worth of square dancing.

Dr. WIESNER. This is why we believe the Secretary of the Interior should be made responsible.

Mr. BURTON. But the Secretary does not have the authority to withhold \$100,000. He has some discretion over the \$10 million but the \$100,000 will be going to the State institutions, or institutions the State designates.

Dr. WIESNER. We believe the language does give him discretion in the initial allocation.

You have a good point, that it is not clear. In other words, if a group came in and he was to judge the plan unsatisfactory, my interpretation is that he does not have to make the initial allocation.

You raise a good question as to what would be done afterwards. He should be given the authority, just as every department head should have the authority, to stop work if he deems it improper.

Mr. BURTON. Somebody should have that right. After 5 years if a particular State has had a half-million dollars and they have produced nothing in water research, how long should that go on?

Mr. MARTIN. It has been my observation, in watching the research program, you wait a long time before you see results. I see this from the man-in-space program.

Dr. WIESNER. It will be a long time before you can say "Here is the place where we have had results," but you can judge the quality of the basic research after a short period of time. People who are knowledgeable will say "Yes, this is a good laboratory and they are productive." That judgment can be made.

Mr. BURTON. You can determine how the \$100,000 has been spent. If they were hiring water scientists, if they had a hydrology laboratory under construction, it is certainly justified. I have an idea out of 50 States and Puerto Rico after 4 or 5 years, unless something like this is done, we will find we have wasted a lot of money, even though it is only \$100,000 a State.

Dr. WIESNER. I wouldn't object to covering that situation and leaving it in the Secretary's hands. The more power he has the better the quality can be, I feel.

Mr. BURTON. That is all I have, Mr. Chairman; thank you.

Mr. ROGERS. Doctor, from the report filed by the Federal Council for Science and Technology I would gather it is generally conceded that these water experiments which are going on in all of the departments ought to continue in your opinion?

Dr. WIESNER. I would not want to go that far. I think the general responsibilities of the departments are sound. On the whole their research programs are reasonably sound.

Our investigations in the preparation of this report did not permit us to make enough judgments of quality or examine carefully enough the individual activities to be able to say to you I am 100 percent convinced it is all good work and there is no overlap.

This is what we intend to look at next year. As I mentioned earlier, Mr. William C. Ackermann is joining our staff and will have full-time

responsibility for this area. We hope next year we will be able to follow this report which sort of brought together everything and gave us a good picture of what is going on. We hope there will be substantive judgments of the quality of the work being done. This is really a continuing effort on our part to get an understanding of the problem and I hope with each passing year we can talk a little more sensibly and more knowledgeably about it.

Mr. ROGERS. Did you find any general jealousy of jurisdiction in the different departments with regard to the programs they were pursuing at the time?

Dr. WIESNER. I think there is some, yes.

Mr. ROGERS. I think it is human nature.

Dr. WIESNER. It is natural. You would be worried if you didn't find it.

Mr. ROGERS. With regard to duplication, which is one of the things we would like to eliminate——

Dr. WIESNER. You should eliminate some and not all. There are some kinds one should encourage.

Mr. ROGERS. I presume the group recognized the fact that in research and development there is a certain amount of duplication and perhaps triplication and quadruplication which you cannot escape if you are going to have a proper research program.

Dr. WIESNER. There are two reasons for it in the Federal Government. First of all, if you have agencies with similar missions which require research, you may feel research is important in order to have them deal with the mission properly. Since basic research activities are usually small compared to the total mission activities that is perhaps reasonable.

Second, you sometimes want more than one group or more than one person working on the problem. It is not always the same group that comes up with the needed answer.

Mr. ROGERS. There are two primary factors we have been talking about. One is what we can find would be possible from passing this legislation, and the other is that it would produce personnel which now seems to be in short supply.

Do you think that perhaps the greatest of the two contributions would be in providing the personnel under this act?

Dr. WIESNER. I don't think I can answer that, sir. I think they are both important. I never know which is more important.

At MIT I ran a large laboratory for the Defense Department. It was always justified on the basis of the research done for the Defense Department. I always felt the graduate students who came from the laboratory were the most important part of the program. I am sure the Defense Department would not have felt this way.

Mr. ROGERS. Since we are talking about two separate factors of research and what it will produce, I was going to pursue it to this end—whether or not you feel this is the best approach to accomplish what we want or would it be better to use the agricultural experiment stations in connection with your regional approach to research for trying to develop new means and methods of carrying out the purposes of this bill, and then on the other hand, in order to meet the need for additional personnel, to provide grants or loans for this particular purpose.

Dr. WIESNER. I don't think you can get the number of graduate

students out of the program for much less than the amount we are talking about. People often lose sight of the fact that the most important part of graduate training is the research a student does.

When people criticize both the Government and universities for the amount of research, and say the universities' business is not to do research but to teach, they don't understand the graduate research process. You are trying to develop a man's intellectual skills, his thinking, experimental techniques, and we don't really know how to teach research except by doing it. These things are thoroughly interrelated.

If you said "Let us tell the schools we want to build graduate skills in water research" they will say "We cannot go far without buildings and research money." It is really the same problem looked at two ways.

Mr. ROGERS. Do you think your group, the group which wrote this report, feels that this approach would produce greater dividends dollarwise, let us say?

Dr. WIESNER. I don't know. They argued about many programs. They could have recommended something similar, such as a grant program to universities. They might have suggested a different way involving the universities. They might well not have focused so much on land-grant colleges, but they would all agree the program of this bill is a quite satisfactory pattern.

Mr. ROGERS. With relation to the Department to have control, do I understand, Doctor, it is your feeling, since the Department of the Interior has been charged throughout our history, more or less, with jurisdiction of the natural resources of this Nation, that water as a natural resource—I so recognize it and I presume everyone else does—naturally should fall within the Department of the Interior so long as the power granted to the Department of the Interior did not infringe upon activities of the other departments in the work they are doing on these problems?

Dr. WIESNER. That is right, and also that they should be responsive to the desires of the other departments.

My office is the interagency mechanism for bringing together people involved in water problems of the various agencies. We would like to see the Interior Department's program build up the activities in the universities by being responsive to the needs and desires of the other agencies as well.

If work involving pollution research were to be financed by the Federal Government in one of these centers, it could conceivably be done in three ways. I would like to have all three ways available.

Interior could do it. If HEW wanted to transfer funds it would be another matter. If Interior wanted to enter directly into a grant arrangement with the institution that should be possible, too. This is really what was meant when I said the Interior Department should be responsive to the needs and desires of the other agencies.

At least there would be one agency which would have the interest and welfare of the center in focus.

Mr. ROGERS. You feel that the agency which is given this authority so far as this act is concerned should also be the cataloging agency?

Dr. WIESNER. No. I have indicated we prefer to have that function carried out by the Science Information Exchange.

Mr. ROGERS. You think the science group, your group, could do that

without undue burden so long as the program itself is carried out by Interior?

Dr. WIESNER. I indicated we are attempting to have this done in all fields of science. We undoubtedly would go on doing this for better or worse even if the catalog were set up. You cannot really put scientific activities in so sharp a category.

There is sufficient overlap and sufficient uncertainty that I am sure the people who run the science exchange program would say "We had better complete this."

It may be that the sponsors of this bill had more detailed information in mind. We believe there is a need for something else in the water resources field and we will experiment with it, and that is an analysis group which takes the information and tries to put it in the form which would be useful. In other words, a long list of things means nothing unless somebody puts it in the right category and examines pieces of it to know precisely what it is for.

One of the things we will explore is how to get a small group of people—I don't know whether small means one, two, or four—possibly associated with the Scientific Information Exchange to do a continuing review of all the data. That is part of the function which has to be done and which is contemplated in the catalog.

That goes beyond cataloging. Trying to understand it is more important than having a catalog. As a matter of fact, we have a catalog, but the catalog itself does not help you much when you are trying to make policy or form judgments about who should do what, and what priority should be observed.

Mr. ROGERS. You think the analysis group should be under the Department of the Interior if they operate the program?

Dr. WIESNER. I would like to keep an open mind on that. There are many logical reasons why it should be there. There are many bureaucratic reasons why you may be overstepping the line you were talking about earlier of what is tolerable at this time.

Mr. ROGERS. Are there further questions?

Thank you very much, Doctor, for your fine presentation. You have been most helpful.

Doctor, there is one further question which Mr. Edmondson had asked me to ask of you, and that is whether or not the Science Information Exchange, the knowledge or information it collects, is non-classified data.

Dr. WIESNER. Up to now we have not included classified military information. This is a troublesome problem.

We are dealing with basic research activities and not development programs, so it is not too large a fraction of the total defense program, but it is a big enough part that you can get a distorted picture of the research in certain areas.

Take the materials field, for example. There is a great deal of secret work there, so we are worried about just how to get that classified material into the machine without compromising it.

We made the decision that until we felt we had 90 or 95 percent of the unclassified material in, which we don't yet have in the nonlife science fields, we would overlook the classified problem, recognizing that in doing that we were incomplete in certain fields.

Mr. ROGERS. Thank you very much.

If there is no further business to come before the subcommittee, we stand adjourned until 9:45 in the morning.

WATER RESOURCES RESEARCH CENTERS

TUESDAY, JULY 23, 1963

HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON IRRIGATION AND RECLAMATION,
OF THE COMMITTEE ON INTERIOR AND INSULAR AFFAIRS,
Washington, D.C.

The subcommittee met, pursuant to recess, at 9:55 a.m., in room 1324, Longworth Building, Hon. Walter Rogers (chairman of the subcommittee) presiding.

Mr. ROGERS. The Subcommittee on Irrigation and Reclamation will come to order for further consideration of pending business.

Our first witness this morning is Dr. Randal M. Robertson, Associate Director (Research), National Science Foundation, accompanied by Dr. Richard G. Ray, Program Director for Geology.

Dr. Robertson, if you will come forward.

Before you start your testimony let the Chair make this observation. Congressman Kenneth Gray had asked to appear, but it seems that some other matters have intervened and without objection Mr. Gray will be permitted to insert his statement in the record immediately following the testimony of Dr. Robertson and Dr. Ray.

Dr. Robertson, you are recognized.

STATEMENT OF DR. RANDAL M. ROBERTSON, ASSOCIATE DIRECTOR (RESEARCH), NATIONAL SCIENCE FOUNDATION; ACCOMPANIED BY DR. RICHARD G. RAY, PROGRAM DIRECTOR FOR GEOLOGY, AND CHARLES B. RUTTENBERG, DEPUTY GENERAL COUNSEL

Dr. ROBERTSON. Mr. Chairman and members of the subcommittee, I am pleased to appear before this committee to give the views of the Foundation on proposed water resources research legislation. I have with me this morning Dr. Richard G. Ray, on my left, who is Program Director for Geology in our Earth Sciences Section and Mr. Charles B. Ruttenberg on my right, our Deputy General Counsel.

We view the water resources field as one of outstanding importance for the future of this country, and believe that increased emphasis on scientific research relating to the problems in this field is essential. In our opinion, enactment of the proposed legislation would be a long step toward mobilizing our scientific strength to attack the many problems which we face.

The principal job of the National Science Foundation is to make the United States strong in science. Anything less than full realization of our scientific potential is too modest a goal for our country.

We regard water resources research as relatively underdeveloped field which must be strengthened. Although the Foundation supports only basic research, we are much interested in the application of new knowledge to practical problems. Hence, the Foundation is ready to work closely with agencies having responsibilities for applied research and development in this area.

Apart from our assigned responsibility for weather modification research, the National Science Foundation has no program whose objective is the solution of specific problems in water resources.

However, many of our basic research grants in mathematics, physics, chemistry, engineering, atmospheric sciences, earth sciences, biology, and the social sciences will contribute to the store of basic knowledge which is essential to progress toward the specific goals of such a program.

Likewise, many of our programs in support of education in the sciences will improve the basic scientific training on which sound specialization is built. In addition to these general background programs we are supporting a number of projects directly related to the area of water resources. I have before me a list of these grants, which can be made part of the record if you so desire.

Mr. ROGERS. How long is that list?

Dr. ROBERTSON. It is a list of eight or nine pages. How many projects would you say?

Dr. RAY. Probably 100 or thereabouts.

Dr. ROBERTSON. Up to 100 individual grants which relate to the field of water resources.

Mr. ROGERS. Without objection, it will be included in the record as part of your statement.

(The material to be furnished follows:)

ATMOSPHERIC SCIENCES (EXCLUDING WEATHER MODIFICATION RESEARCH)

University of Chicago	Dave Fultz	Equipment for meteorological hydrodynamics laboratory	\$200,000
	Dave Fultz	Meteorological experimental hydrodynamics	224,800
Colorado State University	George W. Platzman	Dynamical studies of the atmospheric general circulation	150,000
Florida State University	Herbert Riehl	Facilities for field research in atmospheric sciences	101,500
Harvard University	Charles L. Jordan	Large-scale aspects of air-sea interactions in the tropics	58,400
University of Hawaii	Richard Goody	Atmospheric physics	504,000
	Colin S. Ramage	Atmospheric circulation project for the International Indian Ocean Expedition	181,800
Massachusetts Institute of Technology	Raymond Hide	Hydrodynamics of rotating fluids	40,000
University of Michigan	Hurd C. Willett	Ocean and atmospheric interaction during climatic fluctuations	113,350
	Gerald C. Gill and Wendell E. Hewson	Atmospheric diffusion in transitional states	5,000
University of Minnesota (Duluth)	Donald J. Portman	Heat and water vapor exchange at the air-sea interface for the HIOE	86,500
State University of New York (Buffalo)	John L. Gergen	Atmospheric energy balance	30,400
University of Washington	Richard J. Hogan	Molecular association in supersaturated vapors	28,200
University of Wisconsin	Robert G. Fleagle	Energy transfer near the Earth's surface	140,000
Woods Hole Oceanographic Institution	Reid A. Bryson	Interdisciplinary study in climatology	200,000
	Eric B. Kraus	Air-sea interactions	99,000
	Joseph Levine	Cumulus convection and its interaction with larger scales of motion	45,000

CHEMISTRY

University of California (Los Angeles)	Robert L. Scott	Liquids and solutions	\$36,200
Case Institute of Technology	Gordon M. Barrow	Nature of water-base complexes in solution	30,700
Kansas State University	Clifton E. Melan	Associated water in chelate extractions	16,800
Purdue University	James W. Cobble	The thermodynamic properties of high temperature solutions	17,800

EARTH SCIENCES

American Geophysical Union	William C. Ackermann	Conferences to advance the science of hydrology	\$10,200
California Institute of Technology	Robert P. Sharp	Glaciological investigations on Blue Glacier, Wash.	23,900
University of California (Riverside)	Nathaniel T. Coleman	Sorption of hydrolyzable metal ions by clays	41,600
University of Colorado	Donald D. MacPhail	Glacioclimatic mapping of front range glaciers	17,500
Fordham University	Bartholomew Nagy and Norman O. Smith	Solubility of gases in connate water	19,000
Fresno State College	George M. Stanley	Relations of quaternary lakes of Salton Basin and lower Colorado River	18,300
University of Hawaii	Taiwo Laevastu	Energy exchange between the sea and the atmosphere in the North Pacific	20,400
North Carolina State College	Ralph J. McCracken	Weathering and soil genesis in Piedmont and Coastal Plain regions	13,900
University of North Carolina	William A. White	Topographic effects of solvents in surficial deposits of Coastal Plains	10,000
Pennsylvania State University	Thomas F. Bates	X-ray amorphous mineral materials and their role in the weathering process	50,000
Stanford University	Stanley N. Davis	Micromovements of the land surface produced by subsurface flow of fluids	26,000
A. & M. College of Texas	Lela M. Jeffrey	Development of chemical methods for isolation and characterization of the principal organic compounds in sea water	40,000
University of Washington	P. E. Church	Photography of northwest North American glaciers	25,000
	Maurice Rattray, Jr	Theoretical studies in the dynamics of estuarine circulation	19,600

Basic research grants and contracts related to water resources made by National Science Foundation in fiscal year 1963—Continued

ENGINEERING SCIENCES

Brown University-----	Peter D. Richardson-----	Separated flows-----	\$13,100
California Institute of Technology-----	Frank E. Marble and Duncan W. Kamie-----	The dynamics of fluids containing large numbers of small solid particles-----	63,500
Colorado State University-----	Rolf H. Sabersky-----	Flow over rough surfaces-----	22,500
University of Delaware-----	J. E. Cermak-----	Electrokinetic-potential-fluctuation method for investigation of turbulent flow-----	50,500
Georgia Institute of Technology-----	Vujica M. Yevjevich-----	Analysis of river flow sequence-----	7,800
University of Illinois-----	James P. Hartnett-----	Heat transfer and skin friction in turbulent boundary layers with pressure gradients-----	20,400
Johns Hopkins University-----	Andrew W. Marris-----	The flow of fluids in curved channels-----	13,000
Louisiana Polytechnic Institute-----	Yen Te Chow-----	Basic investigation on watershed hydraulics-----	10,000
University of Maryland-----	Stanley Corrsin-----	Isotropic turbulence-----	62,400
Massachusetts Institute of Technology-----	J. Joseph Thigpen, Ellis M. Killgore, and Charles A. Whitehurst-----	Heat transfer and frost formations in humid air-----	42,700
Michigan State University-----	Joseph M. Marchello-----	Turbulent transport coefficients-----	33,300
University of Michigan-----	John C. Chato-----	Fluid flow and heat transfer in multiple-channel natural circulation systems-----	29,400
State University of New York (Stony Brook)-----	Arthur T. Ippen-----	Transport of sediment in streams-----	57,400
University of Notre Dame-----	Orlando B. Andersland-----	Deformation and flow of frozen soils-----	42,200
Oregon State University-----	Victor L. Streeter-----	Transient flow through closed conduits-----	50,900
Rice University-----	Daniel Dicker-----	Transient flow through porous media-----	7,000
Stanford University-----	James J. Carberry-----	Turbulent and molecular axial diffusion in flow through fixed beds-----	26,600
Swarthmore College-----	James J. Carberry-----	Fluid flow in fixed beds-----	17,100
Syracuse University-----	James G. Knudsen-----	Mechanics of climbing film flow in annular ducts-----	34,200
Tufts University-----	Bernard Atkinson and Arthur W. Busch-----	A film-flow reactor-----	26,600
Utah State University-----	Norman H. Crawford and Ray K. Linsley-----	Runoff processes-----	61,000
University of Washington-----	Arehlie M. Richardson, Jr-----	Strain rate effects in saturated clays-----	21,000
Yale University-----	Salomon Eskimazi-----	Statistical approach to heat diffusion in a fully developed, turbulent pipeflow-----	48,300
	Lloyd M. Trelechen-----	Fluids flows caused by interfacial energy gradients-----	27,100
	Dean F. Peterson, Jr-----	A study of bed roughness in relation to flow in very deep, rough, natural open channels-----	30,100
	Charles A. Sleicher, Jr-----	Transport in turbulent flow: Molecular and turbulent diffusion-----	41,300
	Alan L. Kistler-----	Turbulent separated flows-----	45,000

WEATHER MODIFICATION

Aerometric Research, Inc.	Howard Einar and Robert D. Elliott.	Analysis of water balance of Pacific coast storms.	\$80,000
University of Arizona	Louis J. Battan and Richard A. Kassander, Jr.	Physics of convective clouds and of cloud modification.	46,600
	Myron L. Corrin.	Surface properties of heterogeneous condensation nuclei.	95,400
	Walter H. Evans, Martin A. Uman, and Robert L. Walker.	Field and laboratory studies of lightning processes.	40,000
University of California (Los Angeles)	Joanne S. Malkus.	Cloud formations over heat sources.	25,000
University of Chicago.	Roscoe R. Braham, Jr.	Physical effects of silver iodine seeding in cumulus clouds.	400,000
University of Chicago.	Bernard A. Power.	Method of action of water soluble efficient freezing nuclei.	24,000
University of Illinois.	R. G. Semonin, D. W. Stages, and G. E. Stout.	Cloud electrification studies in Illinois.	5,000
University of Missouri.	Wayne L. Decker.	Rain gage records analysis of the University of Chicago cumulus cloud research project.	39,500
University of Nevada.	Wendell A. Mordy.	Nevada atmospheric research project.	83,000
New York University.	Max A. Woodbury.	Extraterritorial correlations with meteorological parameters.	23,700
State University of New York (Albany).	Narayan R. Gokhale.	Dynamic behavior of nuclei in ice formation.	34,900
	Vincent J. Schaefer.	Cloud physics field research.	53,000
Pennsylvania State University.	Charles L. Hosler.	Cloud and precipitation processes in hilly terrain.	297,600
University of Utah.	Vern J. Hales.	Evaluation of weather modification.	35,000
University of Western Australia.	William C. Macklin.	The physics of the growth of hailstones.	22,900

Dr. ROBERTSON. I would like to make one comment on matters specifically affecting the proposed legislation. In establishing new water resources research centers, the most difficult problem will be the short supply of trained scientists in this field. Even assuming that a certain number of scientists switch to water resources research from collateral fields, manpower will be a limiting factor initially.

Hence, the establishment of these centers must be handled in such a way that the best use is made of available scientists. Initially, for example, it might be wise to establish some centers on a regional basis pending development of additional manpower in the field. If real progress is to be made, the highest standards of quality must be maintained, and this can only be achieved if the centers are manned by first-rate scientists.

That is the end of my brief statement, sir. We will be glad to answer any questions that you may have concerning the Foundation's work.

Mr. ROGERS. Thank you.

Did Dr. Ray have a separate statement?

Dr. RAY. No, sir.

Dr. ROBERTSON. Dr. Ray did not have a prepared statement but he will be available for questions in his special field.

Mr. ROGERS. Thank you for an excellent statement, Dr. Robertson.

The Chair recognizes the chairman of the full committee for questions.

Mr. ASPINALL. Dr. Robertson, we sent to the office of the National Science Foundation a request for a report on the legislation that was proposed.

As yet we have not received that report. Do you know why we have not received it and what that report will contain? Or does your statement take the place of the report?

Dr. ROBERTSON. I would like to turn to Mr. Ruttenberg who handles our legislative matters.

Mr. RUTTENBERG. We have been in touch with the Bureau of the Budget about our comments on the bill. I would say Dr. Robertson's statement would be our submission in support of the bill.

Mr. ASPINALL. We don't know from Dr. Robertson's statement whether he knows what is in the bill or whether he doesn't know what is in the bill.

Mr. RUTTENBERG. I think he does know what is in the bill, we have been through it.

Mr. ASPINALL. Let me ask you this particularly. Who do you want to handle the coordinating authority in this bill?

Dr. ROBERTSON. Mr. Aspinall, I believe that the best mechanism to handle the general coordination of research programs in this field would be a committee of the Federal Council for Science and Technology which I believe has been established and will have members from all the agencies involved in support of water resources research.

This Committee will be under the general auspices of the Office of Science and Technology.

Mr. ASPINALL. What responsibility are you going to give to the Secretary of the Interior, if any?

Dr. ROBERTSON. As I understand the bill, responsibility for managing the program for the establishment of centers and for support

of research in the field of water resources is assigned to the Secretary of the Interior.

He is also asked, as I understand the bill, to maintain knowledge of all research going on in the area and to provide reports from time to time summarizing the activities in this field.

Mr. ASPINALL. I don't want to belabor the question. What bill are you talking about? Are you talking about the Senate bill that is passed, or the Senate bill that was introduced, or the House bills that were introduced?

Dr. ROBERTSON. The one I am most familiar with, sir, is the Senate bill that passed.

Mr. ASPINALL. When they sent that bill over to us, they took out of it all of the authority that was formerly given to the Secretary of the Interior for establishing a new agency and left it all up in the air.

Dr. ROBERTSON. This is a technical matter upon which I would prefer not to comment, but as I read the bill it was my understanding that the assignment of responsibility was to the Department of the Interior for managing these new programs.

Mr. ASPINALL. And what authority would he have over the operations of the Department of Health, Education, and Welfare, over the Department of Agriculture, and over the Department of Defense?

Dr. ROBERTSON. I assume that he would have no authority over these Departments, each one of which would carry out such research as was necessary to support its particular mission.

Mr. ASPINALL. In other words, they would come before the Appropriations Committee in the House and those authorizing committees having jurisdiction, and all of them will continue as they are at the present time.

Dr. ROBERTSON. That is the way I understand it, sir.

I presume that the coordinating mechanism which will be established through the Office of Science and Technology will bring about some changes in distribution of emphasis by the several agencies.

However, each one having an assigned mission in the field would, in support of that mission, carry out research or support research related to its mission; and the coordination of the entire program would be through an interagency committee.

Mr. ASPINALL. If I recollect correctly, the question has already been asked as to whether or not you have effective coordination at the present time, whether or not it is known whether or not there is any duplication in the activities that are going on.

The question has not been satisfactorily answered.

Dr. ROBERTSON. For the last 2 or 3 years there have been committees under the Office of Science and Technology which have been looking into various aspects of the water resources program and which have brought together the various people in the agencies who are concerned with the research aspects of this program.

For example, a report which you have probably seen was issued in February.

Mr. ASPINALL. I have seen that report and have gone through it. It is a very fine report. But it still does not answer my question. It was admitted here yesterday by the witness for defense, that what they expect to do is carry on their programs as they are carrying them on at the present time, and no one questions the validity and the

necessity of their programs, but they just wanted to have a little bit more authority added so that they could add a little bit more to the operations which they already have.

Now, this committee is interested very much in the research activities related to the water resources values that we have, but we do not want duplicatory programs. We are not interested in piling additional operations on top of already existing operations.

Some of us do not believe that the legislation that came over from the Senate, or perhaps either one of the bills that have been introduced in the House has adequate provisions to assure that the money that Uncle Sam puts up for this program will be wisely spent.

Maybe we are thinking as laymen and you folks are thinking as scientists. Maybe there is a feeling that there is no bottom to the barrel as far as you are concerned, but there is as far as we are concerned because the Treasury just does not have unlimited funds.

Now, how do we arrive at the most economical, necessary program in this field?

Dr. ROBERTSON. I might draw the analogy with the program in oceanography in which a number of agencies are carrying on support of research in oceanography—

Mr. ASPINALL. Yes; and one of the departments for which we have jurisdiction asked for a submarine.

Dr. ROBERTSON. There are many agencies interested in oceanography which need to support research in oceanography in furtherance of their mission.

Their research operations are coordinated through the Interagency Committee on Oceanography, and I submit that this is a very effective mechanism for coordination and that there is very little duplication in this field. More important, perhaps, is the fact that some of the gaps that existed before the Committee began its work have been filled in, so that the national program in this field is now more coherent and in a healthier state than it was before this mechanism was established. I believe that we can use the same mechanism effectively in the field of water resources.

It takes hard work on the part of the people concerned and they have to be ready for a certain amount of give and take. But under the guidance of the Federal Council and its Chairman, Dr. Wiesner, a committee of this kind can, I believe, be very effective.

Mr. ASPINALL. Doctor, what limits any program in research, in your opinion? What is your thinking as to what limits a research program?

Dr. ROBERTSON. Well, there are a number of factors; the most important limiting factor is the availability of trained scientists to do the job. That is the most important limitation in this field.

Mr. ASPINALL. Do you put that ahead of the question of finance?

Dr. ROBERTSON. I think in this area the problem is so important and the amount of research, basic research especially, going on in the field is so small relative to the long-range importance of the problem, that we are limited by manpower, not money.

I think that we can come out with a program in this field that would make best use of existing scientists for an amount of money that we can all afford.

Mr. ASPINALL. Why are you limited in this field by a lack of manpower at this time?

Dr. ROBERTSON. This is a field in which a relatively small number of scientists have been trained over the last few years.

Mr. ASPINALL. And why?

Dr. ROBERTSON. That is a hard question to answer, but one reason perhaps is that there have not been sufficient programs in the field to attract the kind of scientific manpower that we need to have working on these problems.

I might turn to Dr. Ray if you would like.

Mr. ASPINALL. I don't want Dr. Ray to answer at the present time, I want you to answer this.

Dr. ROBERTSON. I will be glad to, sir.

Mr. ASPINALL. We are trying to get to a practical program. Everybody has known the value of water for several decades now; have they not?

Dr. ROBERTSON. Yes, sir.

Mr. ASPINALL. And every scientist has known the lack of scientific information as far as water is concerned; is that not right?

Dr. ROBERTSON. Yes, sir.

Mr. ASPINALL. So, you have had the field but you do not have the individuals. What has taken place is that we have put the glamour in the fission and fusion energy research activities, we are now putting it into space. And, doctor, as I understand it, there is no end to what a scientist can think of in those fields. Is that correct?

Dr. ROBERTSON. Well, I think there is a practical limit, but——

Mr. ASPINALL. Do you mean to say that we are approaching the place where the scientists are going to say, "Well, now, we have gone as far as we have to." You see, what bothers me a little bit——

Dr. ROBERTSON. There is a limit to what you can foresee as a reasonable program in the immediate future. The possibilities of science are limitless.

Mr. ASPINALL. Now, how are we going to take these young people that you must train in order to get them in this field—how are we going to take them out of what appears to be the glamour fields and put them into this research operation?

Dr. ROBERTSON. One way, sir——

Mr. ASPINALL. Just by spending money?

Dr. ROBERTSON. I think money is an important element. Perhaps the most important thing is for the Federal Government to have a well-planned program aimed at doing something about the problems in this field.

Mr. ASPINALL. Do you think that setting up a chair or research operation in every land-grant college and possibly at some other State universities is going to do this?

Dr. ROBERTSON. I believe that there are problems that are local and regional which would justify some degree of activity in every State. I believe, on the other hand, that major centers for research in this field would not grow up in every State, they will be——

Mr. ASPINALL. That is not this bill.

Dr. ROBERTSON. They will be regional.

Mr. ASPINALL. That is a part of this bill, but the emphasis of this bill has been that we make money available, \$50 to \$100,000 annually,

for the 50 or more institutions to engage in water research activities.

That is what this legislation does. That is the reason why the presidents of these colleges throughout the United States favor this bill.

Dr. ROBERTSON. Well, as I say, I think that there are local problems that can be attacked at the State level, but I would repeat that we cannot expect to have a major research center in water resources in every State.

I think that there will be a limited number of really large research centers, that some of the institutes or centers will be relatively small and will confine their attention largely to local problems.

Mr. ASPINALL. Well, that is the reason why I asked you about the bill, because the bill gives the emphasis on these university operations.

If this bill passes the way it is every State is going to be in here asking for its part of the kitty. Now, there is an additional amount, maybe twice as large as far as the authorization is concerned, that would go to the operations that you talk about—operations giving more emphasis to larger research centers.

Can we have both and do a good job?

Dr. ROBERTSON. As I understand the bill—and this depends on the extent to which the Department of the Interior would have discretion in establishing these centers and maintaining the grants—there would be a center of some kind ultimately in every State.

Now, I do not believe these should all be set up at once. Some of these might grow into very large and important national centers for research in this field; others would remain small and work on local problems.

I see no reason why there should not be a broad spectrum of types of centers which would be encouraged.

Mr. ASPINALL. Doctor, do you think that the Department of the Interior can handle the division of the appropriations as effectively as the National Science Foundation might in this respect?

Dr. ROBERTSON. Well, the National Science Foundation has long experience in making basic research grants and grants for science education to the universities.

We know basic research and we know the universities, and we can assist any agency in its relationships with the universities in basic research. I regard the water resources field, however, as covering a broader area than basic research.

A program in this field must include applied research, economic surveys, and the development of new systems in the water resources field. This kind of applied work is outside of our stated mission.

Mr. ASPINALL. How far do you think the Federal Government should go in spending the taxpayer's money in what you call "applied research" which I suppose you mean are pilot plants and demonstration plants?

Dr. ROBERTSON. I feel that this is an area in which Federal leadership is necessary. We have to show the way in arriving at better methods of water conservation—

Mr. ASPINALL. Would you give the Secretary of either one of the four Departments involved, unlimited authority to go ahead and build demonstration plants as he may determine, he and his staff may determine to be necessary?

Dr. ROBERTSON. I think there have to be limitations on any program, including fiscal limitations.

Mr. ASPINALL. That is why I want to find out what you think about limitations. You said it was a question of the availability of individuals and I am trying to get you to give me a comparison of that necessity with the necessity of staying within reasonable fund limitations.

Now, \$8 billion from our present budget are being spent for research programs, a little bit over \$8 billion if I remember the figure.

Dr. ROBERTSON. For research and development programs?

Mr. ASPINALL. For research and development programs. Is that about the right proportion of our total budget?

Dr. ROBERTSON. This includes a great deal of development work on military systems if I understand the figure correctly. The amount of money being spent on basic research is of the order of \$1 billion.

Mr. ASPINALL. For all activities?

Dr. ROBERTSON. For all activities.

Mr. ASPINALL. And of that amount, how much is for water research, at the present time?

Dr. RAY. The figure I heard mentioned yesterday was \$66 million for fiscal year 1963.

Dr. ROBERTSON. About \$66 million for basic research in fiscal year 1963 in the area of water resources.

Mr. ASPINALL. Is this all basic research? Is there not some applied research?

Dr. ROBERTSON. Yes. This includes basic and applied research, but no development.

Mr. ASPINALL. Well, it includes the saline water demonstration plants, does it not?

Dr. ROBERTSON. I am not sure of that.

Mr. ASPINALL. I will reserve the balance of my time, I have some more questions.

Mr. ROGERS. Mr. Westland?

Mr. WESTLAND. Mr. Chairman. I have read your statement, Doctor, could you go into any more detail as to what the National Science Foundation is doing in the water resources research area?

Dr. ROBERTSON. Yes, sir.

First of all, I should point out that National Science Foundation considers proposals for basic research from universities and other nonprofit institutions, and our primary concern is to support the highest quality research that is proposed to us.

We do not select water resources as an objective and go out and find research in that field to support. However, from the many research proposals made to us, a substantial number are in the field of water resources or in related areas. I could give you some examples perhaps in that field.

Here is one at Ohio State University, "A Quantitative Analysis of Possible Factors Contributing to Slope Form in Relation to Microclimate." Another example would be "Glaciological Investigations in Central Alaska."

Another would be "Snow Survey on the Arctic Slope of Alaska."

Mr. WESTLAND. Could you tell me how much of a grant was made in those instances, Doctor?

Dr. ROBERTSON. Excuse me?

Mr. WESTLAND. Could you tell me how much of a grant was made in those cases?

Dr. ROBERTSON. Yes.

The first one I mentioned was \$4,440. We granted \$24,000 for the snow survey on the Arctic slope of Alaska, and \$11,330 for glaciological investigations in central Alaska. There are relatively small projects involving one or two professors and their graduate students, usually in universities.

Mr. WESTLAND. Let me ask you this, Doctor. I come from the State of Washington, suppose the University of Washington or Washington State University were to apply to the National Science Foundation for a research grant in water resources, how would the National Science Foundation look on that or would funds be available for such a research project?

Dr. ROBERTSON. Such a proposal would be received, and if we considered it to be basic research we would review it in our normal manner which includes sending it out to specialists in the field for review and in some cases bringing it before an assembled panel of specialists for further review.

Then, if it is deemed worthy of support and fits within the available funds, we would support it by a grant. Perhaps not in the exact amount originally requested, but a reasonable grant in support of the program.

Mr. WESTLAND. Could you give us any estimate of the amount of funds available in the National Science Foundation for research grants in this area?

Dr. ROBERTSON. We do not allocate funds in advance to water resources. We allocate funds according to the needs as they become apparent in the proposals that we receive.

Our earth sciences program would handle most of the water resources projects, especially those in the field of hydrology. This group is given a budget within which it makes grants; their budget is based on estimated proposal receipts for the year, which, for a board field of this kind, can be pretty well predicted. For a rather specialized field like water resources we do not set aside a given amount of money.

Mr. WESTLAND. But you would have funds available in the National Science Foundation for research projects in the water resources field?

Dr. ROBERTSON. Yes, sir; for basic research in this field, and for the development of graduate education in various ways we would have funds.

Mr. WESTLAND. You do not go to the various 50 States and just arbitrarily say, "Well, we are going to give \$100,000 to the university and say, go ahead and make it water research program?"

Dr. ROBERTSON. No, sir.

Mr. WESTLAND. You ask them to come to you, you don't ask them—

Dr. ROBERTSON. We stand ready to consider proposals from any scientist in a university.

Mr. WESTLAND. Go ahead.

Mr. ASPINALL. I think maybe they not only don't do it, they don't want to do it, if I understand his answer.

Mr. WESTLAND. I understand that, too.

What do you think the National Science Foundation would do if you got requests from 50 States for \$100,000 apiece to set up a water resource research project?

Dr. ROBERTSON. Well, we simply can't consider proposals on that basis. They would have to outline a specific program and name the people who are going to work on it and the equipment and facilities they have available to do the job, and we would judge the proposals then on their scientific merit and select the best ones.

Mr. WESTLAND. Would you say, Doctor, that it is generally known throughout the United States that funds are available at the National Science Foundation for research projects in this area? Is it known to the universities?

Dr. ROBERTSON. I believe it is; certainly in basic research. Now, some of them may want to do applied research which would not be eligible under our existing programs for support.

Mr. WESTLAND. And this has been the case for a number of years?

Dr. ROBERTSON. Yes, sir.

Mr. WESTLAND. How many requests have you had from universities for funds for research in the water resources field?

Dr. ROBERTSON. Several hundred, I do not have the exact number.

Mr. WESTLAND. You have had several hundred, but do I gather you only made three grants?

Dr. ROBERTSON. I picked out three from a long list as being representative.

Mr. WESTLAND. You only picked out one university, as I recall, Ohio State University.

Dr. ROBERTSON. One was from Ohio State and the other two were from the University of Alaska.

Mr. WESTLAND. But you have had several hundred applications?

Dr. ROBERTSON. We made about 80 grants in areas related to this field in fiscal year 1963. A list of these is going to be put into the record, we do not have it to give you this morning.

Mr. WESTLAND. Did you get a request from the university of Washington, for example, Doctor, that you recall?

Dr. ROBERTSON. We made grants to the University of Washington in a number of fields. We have one grant in glacier research which, of course, is related to water resources.

Mr. WESTLAND. Well, you are going to make the record of these requests available, are you, for the record? You say you have had 60-some-odd requests last year?

Dr. ROBERTSON. We made 80 grants last year, I assume we have probably received 100 or so requests.

Mr. WESTLAND. Would this be to universities?

Dr. ROBERTSON. Practically all of our grants are to universities. A small number go to nonprofit institutions such as the Woods Hole Oceanographic Institution.

Mr. WESTLAND. Well, let me see now, I think this legislation says that each State would designate a university and then a certain amount of money would be allocated—it is \$100,000, starts at \$75,000 and then

goes to \$100,000—for that designated university to make hydrology research projects.

In other words, that would be 50 universities, I presume. Now, you say you have had several hundred applications last year, or at least you made over 60 grants last year, and I gather that practically all of those were to universities; no?

Dr. ROBERTSON. Dr. Ray wants to reply, I think.

Dr. RAY. We do occasionally make more than one grant to a university, but that probably represents as many as 50 different schools.

Mr. WESTLAND. Would represent more than 50 different schools, perhaps not 50 different States?

Dr. RAY. Conceivably.

Mr. WESTLAND. It might be a couple of schools in the same State?

Dr. RAY. Yes, sir; that is correct.

Mr. WESTLAND. Well, it would sort of appear then that you are already doing to at least a substantial extent what this bill wants to do.

Dr. ROBERTSON. What we are doing is supporting good research that is presented to us.

As I understand the bill it would give the Interior Department the initiative to go out and stimulate research in this area and to build up programs in places that are now weak and need strengthening—

Mr. WESTLAND. I do not get that conception at all, Doctor, I get this as a sort of shotgun approach and it is just going to be allocated in 50 States whether you want to study water or not.

Dr. ROBERTSON. There is also the fact that the Interior Department with its broader mission can support applied research as well as basic research and develop a full program in this field, whereas we are limited to basic research.

Mr. WESTLAND. Well, can you differentiate between applied and basic research, just sort of for the record here, in this field?

Dr. ROBERTSON. Applied in this field would be study of specific problems: How to improve a certain situation in a given place, the principal object being improvement of that particular situation rather than general knowledge.

Basic research aims at understanding of the phenomena involved in the natural processes that underlie the whole situation, but would not get into areas such as seepage from reservoirs in a particular situation, and so on.

Applied research is likely to be more concentrated on the solution of a particular problem in a particular place; basic research gives you a more general knowledge of the phenomena underlying all such matters.

Mr. WESTLAND. Probably the results of the basic research would lead to the application of the results of that?

Dr. ROBERTSON. Yes. There is admittedly not a sharp line between these.

Mr. ASPINALL. Will you yield?

Mr. WESTLAND. Certainly.

Mr. ASPINALL. Is it all right for a layman to think of all these so-called test tube operations as basic research? The laboratory operation as basic research, and the application of those results to specific problems in specific areas as applied research?

Dr. ROBERTSON. Yes; I think that is a good way of looking at it, provided that the test tube experiments come up with knowledge that can be generally applied.

Mr. ASPINALL. Of course, now when you talk that way, then you get into the great fossil fuels area and then you break it down into petroleum and coal and oil shale and tar sand, and then I don't know where you go on basic research.

Would basic research have to apply to all of the fossil-fuel studies, or can you get into the basic research on, shall we say, studying just oil shale alone?

Dr. ROBERTSON. I think that there can be basic research in studying, for example, the origin of oil shales, the geological history of the formations in which they occur so that we learn how such things are formed.

Mr. ASPINALL. Now, separating the kerogen from the rock itself, the shale, would that be a basic research problem or would that be applied research problem?

Dr. ROBERTSON. Studies aimed at concentrating any resource, for example, finding out how to extract oil or concentrate an ore, would fall in general under the applied research category.

I do not want to overemphasize this distinction because as I said before, there is rather a gradual transition from the basic to the applied. Certainly when you start developing a pilot plant to recover, let us say, oil from shale, then you are in the field of development and your object is to come up with a workable system that will do a certain practical job.

Mr. ASPINALL. When you grind up the shale and you apply heat to it by various ways, in a test tube or small furnace, something like that, is that not basic research?

Dr. ROBERTSON. Well, it could be. The fact that it is on a small scale does not necessarily make it basic research, you might have a small pilot plant. It depends on what you are trying to learn. If you are just trying to develop a method of separation, I would call it applied research and development. If you are trying to understand the composition, the structure, the nature of the material itself, then it would be basic research.

Perhaps in this particular field Dr. Ray would like to supplement what I said.

Dr. RAY. No. I think that is sufficient.

Mr. ROGERS. Will the gentleman yield?

Mr. WESTLAND. Certainly.

Mr. ROGERS. Doctor, as I understand you, the National Science Foundation makes grants with regard to basic research.

Dr. ROBERTSON. Yes, sir.

Mr. ROGERS. But not to applied research. Do you have any kind of a yardstick you use to make the determination as to what projects are within your jurisdiction and what without?

Dr. ROBERTSON. The most significant yardstick—we face this every day as we review proposals—and the most significant one is whether this particular piece of work will produce new knowledge that is generally applicable to science, technology, and other areas.

This is the primary yardstick, I would say.

Mr. ROGERS. Thank you, sir.

Mr. Haley?

Mr. HALEY. Dr. Robertson, in your statement you say that one of the things that this legislation would probably run up against would be the shortage of trained scientists in this particular field.

Do you mean by that that the people who are now capable of doing this research is very, very limited?

Dr. ROBERTSON. Yes, sir. I think we have a relatively small number of trained scientists in this field. More than half of them are now working for the Government, I believe. The number in universities is not at all large.

Mr. HALEY. Would you say that approximately 50 percent of those are now working for the Government. Is that correct?

Dr. ROBERTSON. Dr. Ray, do you have the exact figure on that?

Dr. RAY. I do not have the figures on that.

Mr. HALEY. Just a reasonable guess is all right.

Dr. ROBERTSON. About half.

Mr. HALEY. So, any reasonable program started by the Federal Government, if you do not have the men available now you would be taking from, let us say, private enterprise or wherever these people happen to be, colleges, and so forth, you would be merely taking away from the very limited number and putting them in another category of employment, would you not?

Dr. ROBERTSON. To a certain extent, yes. There is also the possibility that people could be encouraged to move from collateral fields into this field. People who had been working in chemistry might move into this field provided that additional stimulus is given to research in the field. So there is the possibility of recruiting them.

Mr. HALEY. That was going to be my next question, Doctor.

Mr. ASPINALL. May I ask a question there?

Mr. HALEY. I yield.

Mr. ASPINALL. Is that your only field, Doctor, the promotion of additional programs in this area of the scientific research for training young, prospective scientists in colleges? Is not that really about your only possibility of getting additional scientists for this work at the present time?

Dr. ROBERTSON. In the long run that is the only way, and for that reason we must have programs in the universities of interesting research which will attract the young graduate to go into this field of research.

Mr. ASPINALL. Do you think that you, Doctor, and those associated with your operation at the present time can glamorize research in water resources to take scientists away from these other programs that I was speaking about awhile ago, space and the like?

Dr. ROBERTSON. I think that in the last few years both oceanography and the atmospheric sciences have moved into a position where work in these fields is more attractive than it was. More young people are going into these fields.

This is to a considerable extent due to the initiative taken by the Government to support research in those fields.

Mr. ASPINALL. If my colleague would yield for one more question. Isn't the work in oceanography largely applied science rather than basic science?

Dr. ROBERTSON. No. There is a great deal of basic research in oceanography: understanding the circulations of the oceans, for example, and the factors affecting that circulation; the salinity and its variation from place to place; and the interaction between the ocean and the atmosphere. All these are basic.

Mr. ASPINALL. Thank you.

Mr. HALEY. Doctor, from your testimony here this morning, it would appear to me that what we are doing is to get the cart before the horse. Apparently in these programs there is a limited number of people competent to do this work.

Now, how long does it take to train an individual to be competent to do this kind of work, water research, and your basic and applied research? Would it take considerable time to educate them to the point where they are competent to do this work? How long?

Dr. ROBERTSON. I would say it takes about 4 years in college and 4 or 5 years in graduate school before he can start practicing his scientific profession.

Mr. HALEY. So, money is not the answer to this program or just setting up additional programs is not the answer. Training people first to do this work is the real problem, is it not?

Dr. ROBERTSON. Training is a key to the whole problem. I also think we have to provide an increased research effort in the universities in this field in order to attract graduate students into the field.

If people who come through college majoring in physics or chemistry see an important program going on in their university in the water resources field, they may decide to go into that field as a career and sign up to take their Ph. D. in some aspect of water resources.

If no such program is going on, they will probably end up in one of the space related fields, for example.

Mr. HALEY. So, just passing the legislation to set up programs is not the answer at all to this problem. As the chairman of the full committee just said a little while ago, there must be some effort first to glamorize this program to where you will get the necessary manpower to operate it, because if I understand your statement, we are short right now of people who are competent to do this particular research, so setting up another program which, I don't know how many we have here, but it is quite a number, it covers approximately three pages, setting up programs is not the answer; training people to be proficient and skilled in these sciences is what we need, is it not?

Dr. ROBERTSON. These people have to be recruited in order to be trained, and you need strengthened research programs in as many universities as possible in order that people may be recruited into the field. To this extent at least the setting up of the program comes first, certainly the strengthening of the existing programs and getting more effort going in this field. You can only do this by focusing attention on the problem—by having some agency that feels responsible for building up work in this field, that will go out and do the necessary groundwork and missionary work in the universities to push it along. This has to go on in parallel with the training of graduate students.

Mr. HALEY. Do you think this proposed legislation would do that, Doctor?

Dr. ROBERTSON. I think it would be an important step toward doing it. I feel it is very important that it be administered in a way that

will conserve and effectively utilize existing manpower, and that those responsible for administering this program have discretion to establish only those centers or institutes that can be adequately manned by highly qualified people and which can show promise of doing high-quality work.

Mr. HALEY. Thank you, Doctor.

Mr. ROGERS. Mr. Chenoweth?

Mr. CHENOWETH. Doctor; you mentioned that the great problem is going to be to obtain these scientists. What is the definition of a scientist? Is a college graduate who majored in chemistry or physics a scientist?

Dr. ROBERTSON. The leaders in a program of this kind generally will be people who have been trained through the doctor's degree in some special field of science.

Mr. CHENOWETH. That would be 4 years of college and then 3 additional years?

Dr. ROBERTSON. Three to five years of graduate study.

Mr. CHENOWETH. In addition?

Dr. ROBERTSON. There will be many jobs for people trained at different levels, but the leadership for the programs must have that training.

Mr. ASPINALL. If my colleague will yield?

Mr. CHENOWETH. Yes.

Mr. ASPINALL. Doctor, you are not making a scientist by giving him 3 or 4 or 5 years of graduate work. That is not true, he can do it on his own or by active work in a laboratory or in applied scientific operations.

It so happens that we have a good many people in the nuclear field and in the space field that have B.S. or M.S. degrees that have supervision over doctors.

Just the mere fact of getting this additional schoolwork is not near as important as having the interest in the operation that is taking that individual's time. Is that not right?

Dr. ROBERTSON. Interest and ability are certainly the most important things. I think the most efficient way, though, of making a scientist out of a person who has the innate ability and the innate interest is to train him in a university through the Ph. D. degree.

This is not essential in every case by any means, but I think on the whole this is the way we must train our scientists.

Mr. ROGERS. Thank you very much.

Thank you, Mr. Chenoweth.

Mr. CHENOWETH. Doctor, after completing all of this training and a man has his Ph. D. degree, what income would he receive? What would the inducement be to him from a monetary standpoint?

Dr. ROBERTSON. This varies from field to field. You are familiar with the Government salary structure. I would say that in industry it is perhaps somewhat better: the trained scientists perhaps starts at a somewhat higher salary and has an ultimately higher salary to look forward to.

Mr. CHENOWETH. What are we paying our scientists? What is the Federal Government paying for competent, qualified, experienced scientists who are recognized as authorities in their field? What salary would such a person command?

Dr. ROBERTSON. Many of our supervising scientists in laboratories are at the GS-15 or higher level and this salary is of the order of say, \$15,000.

Mr. BURTON. Will the gentleman yield?

Mr. CHENOWETH. Yes.

Mr. BURTON. I would like to comment at this point that in Utah, Doctor, we have already established a State water research laboratory and the way the term "scientist" is being batted around here, most of the people who are doing our water research out there are not "scientists" in the sense that we are employing the term here, but they are engineers. They are people who study waterflow, hydrology; they are making their contribution not because they are trained in physics or biology but they are engineers and you would not normally consider them "scientists." You are going to find if we adopt this program that there is going to be an awful lot of people trained in these fields.

Dr. ROBERTSON. I agree that in the broad attack on this field we are going to need lots of engineers because many of the water resources problems are engineering problems. We will need both the practicing engineer and the research engineer.

Most of our research engineers now are people who have graduate training. You will need a wide spectrum of people in science and technology working on a program of this kind.

Mr. ROGERS. Would the gentlemen yield?

Mr. CHENOWETH. Yes.

Mr. ROGERS. How do you differentiate between an engineer and a scientist, doctor? Do you determine that by the degrees he has, or by his experience?

Dr. ROBERTSON. This is a subject on which it is hard to find agreement, but in general the scientist is a man who is looking for new scientific knowledge, or involved in passing on such knowledge to others. An engineer is a man who puts all the available resources of knowledge and practical art to work on a problem in technology.

Mr. ROGERS. Thank you, Mr. Chenoweth.

Mr. CHENOWETH. What is our situation today, Doctor, as it relates to engineers or scientists? Are we short in either category and what is the present outlook? You expressed some concern in your statement as to the availability of scientists in case we should establish this water research program in the colleges of the country. What is the situation right now?

Dr. ROBERTSON. Manpower, I think, will be a critically limiting factor in water resources. In the general area of science and engineering I would say that the supply is tight in both categories and getting tighter.

We are trying to take measures now to stimulate more people to be trained as scientists, especially in the engineering, mathematical, and physical sciences, where we foresee a major shortage in 10 years unless something drastic is done now.

Mr. CHENOWETH. The National Science Foundation now has its own training program. You do have a program where you take outstanding students and train them?

Dr. ROBERTSON. Yes, sir, we have a fellowship program and a number of programs aimed at improving the education of people in science at all levels.

Mr. CHIENOWETH. What would you say about the charges that are being made that NASA is taking more than its share of our manpower pool of scientists and engineers, trained people? Is that a just accusation or not?

Dr. ROBERTSON. Well, NASA has a very important job to do, and I can see that they have to take every measure that they can to do it.

This involves a lot of scientists and engineers. One reason that there may develop a shortage in 10 years is the requirement for engineers and scientists in the space program.

Mr. CHIENOWETH. And this is working a hardship upon the other fields. They are short of trained scientists because of this large demand for the space program. Is that correct?

Dr. ROBERTSON. That is part of the problem.

Mr. CHIENOWETH. And the situation will continue, will it not, for some years?

Mr. ASPINALL. If my colleague will yield. Doctor, the gentleman from Colorado asking that question has a dual responsibility to the Congress. He is a member of this committee; he is also a member of the Space Committee.

Mr. CHIENOWETH. I appreciate my colleague's observation. I was just curious to see where you stand. I don't want to involve you in any controversy, Doctor. I would like to have your observations.

Dr. ROBERTSON. All of these programs are important. We support the space programs heartily, and it is just a matter of working out some kind of distribution.

Mr. CHIENOWETH. I would like to go further into the space picture but I will not do so for lack of time. I would like to get your ideas on the moon shot, but I will forego that inquiry for the moment. I have just one final observation, Doctor. Is it your attitude then that there would be serious difficulties involved in obtaining the scientists which would be required for this program?

Dr. ROBERTSON. This would be a problem throughout the program. However, I feel that a program of this kind is necessary if we are to build up the manpower in the field.

Mr. CHIENOWETH. Would one of the purposes of the program be to build up manpower in the field of water research?

Dr. ROBERTSON. It would have both objectives. I think the program should be run in such a way that it will encourage the training of new scientists and engineers to work in this field.

Mr. CHIENOWETH. We are not neglecting any field of research right now, are we, doctor? Would you agree that we are doing pretty well in all types of research? The Federal Government is assuming more and more responsibilities in the research field. Is that a fair observation?

Dr. ROBERTSON. We decline a great many proposals for good research that we feel should be done, but which cannot be supported with available funds.

Mr. CHIENOWETH. What is your appropriation for the National Science Foundation?

Dr. ROBERTSON. The 1963 appropriation was \$326 million.

Mr. CHIENOWETH. How much of that is spent for your training program? Just roughly?

Dr. ROBERTSON. Oh, roughly, \$100 million in science education and related activities. Of course, a great deal of training goes on through

the research grants; that is, our research grants are primarily for research, but many graduate students work on those programs and are in training while the research is being done.

Mr. CHENOWETH. We are now in the business of training scientists in a most substantial way and we are not neglecting this field. Is that a fair observation?

Dr. ROBERTSON. It is not being neglected, but there is lots more to be done if we are going to get on with it.

Mr. CHENOWETH. Much more is being done all the time, I observe this in the space program, Doctor.

Dr. ROBERTSON. Yes, sir.

Mr. CHENOWETH. Thank you, Doctor.

Mr. ROGERS. Mr. Morris?

Mr. MORRIS. I must admit I am a little confused. My intention in introducing the bill was to provide a source of research scientists in research of water. Now, we seem to have gotten off into other fields which may be even more important than the water research, but first I would like to ask you, Doctor, How do you train a research scientists?

Dr. ROBERTSON. A research scientists is trained primarily by doing research. He also has to take a great many courses in order that he will have an adequate background of knowledge.

Mr. MORRIS. I understand that he has to know how to read and write.

Dr. ROBERTSON. It is doing the research and writing his thesis that is the critical part of his training.

Mr. MORRIS. But the only real way you can train a research scientist is for him to do research, isn't that correct?

Dr. ROBERTSON. That is an absolutely essential part of his training, sir.

Mr. MORRIS. Now, you apparently do not agree with the language of this bill which gives the 50 States the opportunity to establish a research center or gives them funds to assist them in research in basic water research?

Dr. ROBERTSON. I think I would support the general outline of this bill, provided that the Secretary of Interior would have discretion in establishing these centers, to insure that they are properly manned and that the quality of the work to be done is high.

Mr. MORRIS. All right.

Under the Senate bill, S. 2, or under the House bill, H.R. 2683, do you think the Secretary has this authority in title 1?

Dr. ROBERTSON. As I read it this was slightly obscure to me, not being an expert on legislation. There were clauses in there which seemed to imply that rules and regulations would be established by the Secretary and that the funds would be made available after due consideration of some kind. Perhaps Mr. Ruttenberg—

Mr. MORRIS. Would you have your counsel comment. What is your position on title 1? Does the Secretary or does he not have the authority to withhold grants from one State?

Mr. RUTTENBERG. Well, speaking as an attorney I think that it could be spelled out a little more clearly.

In looking at S. 2 which passed the Senate and is now in the House, section 104 says that the Secretary of the Interior shall ascertain whether the requirements of section 101 have been met as to each

State; section 101 is that portion of the bill which relates to the payment to the institutions for setting up the institutes, and the implication, even though I don't necessarily think it was intended, is that this would be more or less administrative action, checking vouchers and so on, I think that it could be made clear that the Secretary of the Interior shall have responsibility for determining whether the requirements of the whole bill have been met as to the quality of the research. I think it is a technical change, but in my view the point should be more clear.

Mr. MORRIS. Now, you testified that you feel there is a shortage of research scientists in the field of research on water? Did I understand your testimony correctly?

Dr. ROBERTSON. Yes, sir, the number of people—

Mr. MORRIS. I don't mean that you said a shortage, but you did indicate that the supply of these particular people in this country is not as great as we would like to have a good national asset in this field.

Dr. ROBERTSON. The supply should be a limiting factor in strengthening or broadening programs in this field.

Mr. MORRIS. But the only way you can build up the supply is through the training of these people, and the only way you can train them, as you yourself testified, is by them doing the actual research themselves.

Dr. ROBERTSON. That is right, that is why I feel that we need to move ahead to strengthen programs in universities in order to train and attract the kind of people that we are going to need in the future.

Mr. MORRIS. Well, let us go over to the retrieval and coordination of scientific information that may result from not only this legislation but any research that is being done on water.

As I understand it now there is an office over in the Smithsonian Institute called the Science Information Exchange.

Dr. ROBERTSON. Yes, sir.

Mr. MORRIS. Now, what is the purpose of this office?

Dr. ROBERTSON. The primary purpose of the SIE is to provide a list of ongoing research programs in all fields, it is a resource to which you can go and find out who is doing what and where they are.

Mr. MORRIS. Well, if we made the Office of Science and Technology responsible for the research in the water field, the coordination and cataloging, then we would have all our other scientific activities being cataloged and coordinated by the Science Information Exchange of the Smithsonian Institute, would we not?

Dr. ROBERTSON. I believe that the Office of Science and Technology does not handle any of the cataloging work in any field, even in fields in which they are carrying out coordination; their coordination is through committees of the Federal Council for Scientific Technology. The Science Information Exchange, when it is fully effective, will back up all of these efforts on a Government-wide basis.

Mr. MORRIS. I did not mean to imply that I thought the Office of Science and Technology did the cataloging now, but there have been various proposals put forth during this hearing of what office is the best to coordinate this information if this act passes, and I understood you to testify that you thought the Office of Science and Tech-

nology was the proper place to do the coordinating and cataloging if this legislation should pass and become a statute.

Dr. ROBERTSON. Just the coordinating, sir; I felt that the inter-agency committee, which would have responsibility for coordination, should be set up under the Federal Council which operates in the Office of Science and Technology. Ultimately the cataloging, which might well be started in by Interior, should end up in the Science Information Exchange.

Mr. MORRIS. Now, do you have any comment to make on title 2 of the proposed legislation? This is the title which gives the Secretary of the Interior \$10 million annually after 5 years to undertake any project which he may deem necessary and feasible in applied research to administration of the Department of the Interior.

Dr. ROBERTSON. I think this would be an important program and can be managed by the Department of Interior. It will be related in many ways to the kind of programs that we carry out, but would be done more directly in support of their mission and would include applied research and exploratory development as well as basic research.

Mr. MORRIS. Is this not very similar to what the National Science Foundation does?

Dr. ROBERTSON. The Science Foundation does support basic research by research grants to universities. We do not go into applied research.

Mr. MORRIS. Do you not give out some grants for mission research?

Dr. ROBERTSON. Not explicitly. We have a broad mission which is to make the country strong in science, so we support the best research that is proposed to us. Only in the field of weather modification do we support specific programs aimed at a particular goal.

Mr. MORRIS. No more questions, Mr. Chairman.

Mr. ROGERS. Mr. Burton?

Mr. BURTON. No, I have no questions, Mr. Chairman.

Mr. ROGERS. Mr. Duncan?

Mr. DUNCAN. No questions.

Mr. ROGERS. Mr. Morton.

Mr. MORTON. Doctor, the part of this bill that worries me is title 1. This does seem to me to be somewhat of a grab bag approach because we are going to suddenly establish water resource research centers in all of the States, at least if they want them, and one of the concerns I have is that perhaps in some areas where this research is very much needed and there is a local application to the research we may not have the personnel trained or we may not have an inclination on the part of the university in that area to accept this grant and there establish a program.

Now, you made a statement a minute ago that you felt that this thing should be done on a regional basis and that we may run into some trouble, at least I gathered that from your remark, in just wholesale giving this opportunity to all the States. I wonder if you would amplify that regional idea you had a little bit.

Dr. ROBERTSON. I feel that it is important that the agency managing a program of this kind have some discretion in setting up such institutes. Where initially it might be impossible to establish an institute in each of two adjacent States, it might be possible to develop one which would be for those two States working together.

Mr. MORTON. I agree with that and I do not feel that that is spelled out sufficiently in this bill.

Now, we do have a limited manpower; we also obviously have limited facilities in some of these substitutions for this research, and if we approached it on a regional basis I would feel that we would get more for our dollar instead of just making this available to all the States, but I feel there should be some management in the selection of the areas. You do agree on this point?

Dr. ROBERTSON. I agree that there should be discretion in establishing these centers even though ultimately you end up with one in each State. I think this should only be done as it becomes clear that people are available and that a good program can be mounted.

Mr. MORTON. Do you feel that there has to be a central direction to this program with actual experiments or actual projects spelled out from a central management or that these institutes or centers would be creative to the point that they would bring up the problems as they saw them?

Dr. ROBERTSON. I think the initiative for new ideas should be dispersed to the various centers. There should, of course, be a central group with concern for the overall field and capable of bringing problems to the attention of the several groups, but I feel it would be a real mistake to try to mastermind the program from some central agency and assign jobs to the various centers.

Mr. MORTON. In your own organization among the many grants that you have there must be considerable duplication of effort and discovery of various new points of knowledge, is there not?

Dr. ROBERTSON. Many people are, of course, working on the same general scientific problem; usually, however, with a different approach. Scientists in a given field are usually in very good communication. No one wants to do exactly the same thing as someone else, they would rather take a different approach to the problem. Duplication among the basic scientists is pretty well eliminated by the maintenance of proper communication. Science is a self-disciplining activity in many ways, even though many may be attacking the same problem, the genetic problem in biology, for example.

Mr. MORTON. Would this communication, you think, exist in this area of water research so that we could feel fairly confident that there would not be a great deal of duplication of effort in a wide program such as this, or would there have to be a central agent responsible to generate this communication?

Dr. ROBERTSON. I think it would be useful for the central agency to encourage communication, especially across disciplinary lines where the normal interchange might not always take place. As you get more to the applied side and into development, it is extremely important that this be carefully watched for duplication. As I pointed out, duplication in basic research can be eliminated by proper communication among scientists.

Mr. MORTON. I think that is all I have, Mr. Chairman, thank you very much, Doctor.

Mr. ROGERS. Mr. White?

Mr. WHITE. I am disturbed by one thing that you said in answer to the chairman of the full committee.

Mr. Robertson, the chairman of the full committee asked you about the end point on space research and so forth, and you indicated that

you thought there was an end point. I am wondering if that is really what you feel.

Dr. ROBERTSON. Well, I explained in a subsequent remark that you can see a limit in current programs, but that science in the long run is limitless. Vannevar Bush referred to "science, the endless frontier." Our imaginations cannot always penetrate beyond what we can see before us, but we know that beyond the knowledge we get by going to the moon there will be further knowledge by visiting planets.

Mr. WHITE. Well, he also referred to the nuclear research, too, that was included in his question.

Dr. ROBERTSON. Again, in nuclear science we are up against the fact that we do not understand the strange particles that have been discovered in recent years. The elementary particles, the forces between them, and their origin are not now explained by any satisfactory theory.

Mr. WHITE. What you are really saying is there is no end point?

Dr. ROBERTSON. That is correct.

Mr. WHITE. I hope that is what you are saying because I would hate to have you in the position you are in feeling that there is an end point to research and scientific development.

Dr. ROBERTSON. The only end point I implied was what can be done now with available resources in a definite time.

Mr. WHITE. You have said here several times, strong in science. What do you mean by strong in science?

Dr. ROBERTSON. Well, if this country is to be strong in science, which is the context in which I used that phrase, we must have a large body of trained scientists doing important work and publishing that work. It is very difficult to judge scientific strength, but our normal method is to ask how a man stands among his colleagues on an international basis. American science has become recognized throughout the world in many fields as being in the lead on a worldwide basis.

Mr. WHITE. I hear things that are in opposition to what you have just said; I hear it a great many times here, coming out of countries behind the Iron Curtain that are exceeding us in many fields.

Dr. ROBERTSON. Well, they have made remarkable progress and in some limited engineering fields related to the space effort I would say they are ahead of us. On the whole our science is strong, we are dedicated to making it stronger.

Mr. WHITE. What is the difference between science and technology? You have used the two words with a separate meaning.

Dr. ROBERTSON. Science in general is our effort to understand the world about us; technology is the effort to put that knowledge to work in the production of useful systems and devices, things that people can use.

Mr. WHITE. One thing that I would like to have you comment on. You seem to indicate that the place to create all of this water resource information is at the graduate level. It would seem to me that the undergraduate curriculum could include many courses with respect to the problems of water resources, and emphasis could be given in this area as well as in the graduate area.

Dr. ROBERTSON. Yes; I think that is true. For research purposes the graduate area is most important. For the civil engineer, for

example, who is going into water resources work, it might be very important to have certain specialized courses available so that he can get into his job faster as a result of having those courses.

Mr. WHITE. A young man that would elect to go into this field would not necessarily want to take some of the electives or all the required courses of a mining engineer, even courses in geology or civil engineering or mechanical engineering or those required for a degree in physics or in chemistry?

Dr. ROBERTSON. Actually this field is so broad that it is going to require many types of specialists, not just one water resource scientist, but others including hydrologists who specialize in understanding water as it goes through the hydrologic cycle.

Mr. WHITE. You are getting into empirical relationships that are very difficult to tie down when you are talking about hydraulics rather than pure science. There is a field there that you could spend your entire lifetime on and several other people's before you would ultimately come up with a pure science.

Dr. ROBERTSON. In the broad sense, again, this field includes sociological aspects, economic aspects, and biological aspects relating, for example, to transpiration in plant communities.

Mr. WHITE. To get back to this particular legislation, it seems to me that what we are trying to do is fit these people for this particular chosen profession and trying to instill an interest in them and that the purpose of this legislation would be to make available to them the educational opportunities for them to go into this research or graduate work.

Dr. ROBERTSON. This is a very important part of the legislation.

Mr. WHITE. Because, as you have said here, anyone thinking about it can see that the field is limitless, there is no bounds to it, you can approach the water problem from almost every angle that you would like. These people should be fitted as well as they can be, both in undergraduate and graduate work, and we are trying to come up with the correct solution to this problem. It seems to me that we should do this on a regional basis, however, and in some areas I can see where a State-by-State approach would be helpful. Do you agree with this thought?

Dr. ROBERTSON. I think that a State-by-State approach makes a good deal of sense, but we cannot create a major institute in every State.

Mr. WHITE. That is true.

Dr. ROBERTSON. I think we need centers concerned with this broad problem to which sociologists, economists, physicists, hydrologists, and others can come, and which will in a sense bring these people together in order that different aspects of the problem may be attacked by each one in his own specialty.

Mr. WHITE. Mr. Chairman, I do not have any more questions.

Mr. ROGERS. Mr. Gill?

Mr. GILL. Yes, just a few questions, Mr. Chairman.

I would like to pursue the thoughts raised by Mr. Morton and Mr. White with regard to regional centers. Would it not be better to have a flexible arrangement of some sort because I can think of at least two States—both of which are represented on this subcommittee—which would not fit too well to adjacent regions because they

are not adjacent. For example, Alaska may have certain problems which may not be able to be handled by a Northwest region. I am certain that my State of Hawaii would have a little trouble considering water problems in conjunction with the west coast. Would it not be better if we decide that a regional approach to research could be the key to this bill, but allow a certain flexibility for those special cases which I have cited to you?

Dr. ROBERTSON. I believe there should be flexibility in the administration of any legislation in this regard.

Mr. GILL. So, in some cases a regional approach might be best and in other cases an individual State approach might be best; is that correct?

Dr. ROBERTSON. Yes, although in the long run it seems to me that some centralized activity in each State could be very valuable, but not necessarily a large enterprise.

Mr. GILL. I wonder if we could look briefly at the process of creating scientists, engineers, or technicians in any given field. You mentioned that the undergraduate process and the graduate student process entered into this. The process of getting a Ph. D. is certainly part of creating technicians and scientists in any research field. Could we look a little bit at what happens inside a university? Suppose you have a group of upper division students in various scientific endeavors and this group generally is interested in pursuing their education further, perhaps getting a doctorate or a master's degree: What are the factors that influence their decision as to the direction they should follow?

Dr. ROBERTSON. First of all, there is a certain amount of momentum to keep right on in the field in which they are working. If they are majoring in chemistry there is a momentum factor which tends to send them on into graduate research in chemistry. That is the natural thing to do.

A second factor is the availability of fellowships or jobs which will enable them to carry on with their work. They may be deflected one way or another by where the fellowship or job is available, although, as was pointed out earlier, the interest in his field is usually such that he is willing to make some sacrifice in order to pursue the line that he wants.

Now, a third factor might be contact with some very interesting activity in research that is going on either in the same school or elsewhere. Perhaps he worked for a summer at the Woods Hole Oceanographic Institution and got interested in their problems; he might then switch from the field he was in into oceanography. If there is a very exciting project in space research going on at his campus, this may attract him. So a number of factors, including others I may not have mentioned, are involved in this process.

If there is nothing exciting going on that he can see in a field and if there are not very many jobs, it is unlikely that he will move in that direction. So you have to have a certain minimum activity, and it should be high-grade, interesting activity going on if you want to attract him.

Mr. GILL. In other words, if you want a field of science developed you have to polarize interest around that field of action; is that correct?

Dr. ROBERTSON. Yes.

Mr. GILL. And the universal polarizing agent is money; isn't that correct?

Dr. ROBERTSON. It is money and people. The man who is interested in his program and pushing it hard tends to attract graduate students around him. Of course, he is better off if he is well supported with money; he can take on more assistants and get more people working with him, but it is important to have a leader that the younger people can look to.

Mr. GILL. In other words, it is fair to say that there certainly would not be as many scientists, engineers, technicians, or whatnot in the electronics or nuclear fields at the present time if there had not been a tremendous amount of money diffused into these programs not only in the universities but in the private industry as well. Isn't that correct?

Dr. ROBERTSON. It has had an important effect. Jobs available after graduation have influenced people. The notices in the papers about such jobs have influenced people.

Mr. GILL. I don't know whether there is such a figure, Doctor, but do you have any idea of the proportion of basic scientific research which is supported by the Government as distinguished from that supported by private sources?

Dr. ROBERTSON. We have a figure on that, I do not have it in mind at the moment.

Mr. GILL. I don't mean an exact percentage, I mean something general like a half, a quarter, or two thirds.

Dr. ROBERTSON. More than half of the basic research, I would say, is supported by the Government.

Mr. GILL. It is roughly split between the Government and the private sector?

Dr. ROBERTSON. Roughly.

Mr. GILL. And of both proportions do you have any idea what proportions go through the universities throughout the country?

Dr. ROBERTSON. I would say that about \$500 million of Federal money goes to the universities for research.

Mr. GILL. And a fair amount of the private money as well?

Dr. ROBERTSON. Some of the private money; a good deal of the private money goes into industrial laboratory research.

Mr. GILL. Thank you, Mr. Chairman.

Mr. ROGERS. Doctor, just one or two questions.

As I understand it you differ from Dr. Wiesner with regard to where the nerve center of this operation would be. That is, you feel that it ought to be under Dr. Wiesner's office?

Dr. ROBERTSON. I feel that the center for coordination; that is, getting the different agents together to compare notes and make joint plans, should be under the Federal Council. This does not mean that the program would be directed from that focus, since the Federal Council does not direct research. Each agency involved operates within its assigned mission, but meets with others there at the Federal Council to work out mutual problems. This is just what would be done by an interagency committee in this field. Presumably the Department of Interior, having additional assigned responsibility, would play a major role and perhaps have the chairmanship of that particular committee.

Mr. ROGERS. That is not too far from Dr. Weisner's thinking, then, because he felt that the operational activities ought to be in the Department of the Interior; as I understood him, because it is that Department of Government addressing itself to the natural resources.

Dr. ROBERTSON. I think our position is quite close to Dr. Wiesner's.

Mr. ROGERS. I wanted to clear that up. Let me ask you one further thing, Doctor.

Do you feel that it is highly probable that the best benefits of this type of legislation could come out of the fact that it would open the door to provide more personnel in this field in which he is working at the present time?

Dr. ROBERTSON. That will be a major benefit, we hope.

Mr. ROGERS. As the matter presently stands at the National Science Foundation, you have all of the powers to make grants and to work on this problem insofar as basic research is concerned, at the present time.

Dr. ROBERTSON. Yes, sir.

Mr. ROGERS. So this legislation adds to this research program, applied research, as I understand it, and creates the situation where it will be divided among the States.

Now, I understand there is some difference as to whether or not this is mandatory or not, as to whether these States would be entitled to this money and it could not go anyplace else.

I asked Dr. Wiesner yesterday if he thought this same thing could be accomplished insofar as your regional activities are concerned by letting the agricultural experiment stations in the different areas of our country handle this type of program. He did not seem to think so; he seemed to think that the greatest benefits would come out of permitting these programs to be used in the land-grant colleges and the universities as expressed in the bill. Is that your feeling on it?

Dr. ROBERTSON. I would be inclined to agree with that.

Mr. ROGERS. Now, if you just were going to talk about the developments from research, the regional approach would have merit, but you would lose some of your force to produce additional personnel if you did that, would you not?

Dr. ROBERTSON. Yes.

Mr. ROGERS. At least that is my feeling about it and if I am wrong I hope you will correct me.

Dr. ROBERTSON. I think a great many people go to their State university, and if there is an active program, even a small one in this field, it could help encourage some of them to go into this field, and to that extent some sort of center in every State would have a beneficial effect on recruiting first-rate people.

Mr. ROGERS. The chairman has some questions, I think he wants to ask.

Mr. ASPINALL. Doctor Robertson, I am sure the committee has appreciated your willingness to be here this morning with your staff.

Does the National Science Foundation have in its basic authority any responsibility for advising and assisting the Congress of the United States?

Dr. ROBERTSON. Well, we are certainly ready and glad to advise and assist in any way you may wish.

Mr. ASPINALL. We are glad to have you here, maybe your counsel would answer that for the record.

Mr. RUTTENBERG. It is not specifically stated as such, Mr. Aspinall. Section 3-A1 of the Foundation Act states, however, that the Foundation is authorized and directed to develop and encourage the pursuit of a national policy for the promotion of basic research and education in the sciences. I think development of a national policy would involve such advice.

Mr. ASPINALL. All right.

Dr. Robertson, are you familiar with the story or have you read the story rather that appears in this morning's Post under the caption of "Weather Modification Studies Urged in Report," the article by Harding Simmons, staff reporter?

Dr. ROBERTSON. I have heard about it but I have not had a chance to read it yet.

Mr. ASPINALL. Well, the article reportedly comes from an 84-page report transmitted by the National Science Foundation to the President. The President released it yesterday. There are some statements here about activities involving the use of the phrase "basic research." I just wondered whether you agreed that everything that the reporter has referred to is basic research or is some of it applied research.

Dr. ROBERTSON. In the field of weather modification, of course, we are not limited to basic research; however, at this stage in the program we feel that basic research should be emphasized because we really do not have all of the knowledge of cloud physics and atmospheric phenomena that are needed in order to get on with the applied research and development that hopefully someday will enter into this field of weather modification.

Mr. ASPINALL. The article states that you are now spending about \$4½ million a year on weather modification programs. Is that correct?

Dr. ROBERTSON. That is for the entire Federal Government. We are spending about \$6.6 million on the NSF atmospheric sciences program, and a smaller amount on weather modification as such. In fiscal year 1963 we supported \$1.3 million in projects directly concerned with weather modification.

Mr. ASPINALL. In fiscal year 1964 what did you ask for, what amount?

Dr. ROBERTSON. In fiscal year 1964 I believe we have \$1.5 million specifically assigned to that program in our budget.

Mr. ASPINALL. This, of course, is closely related to the water research field.

Dr. ROBERTSON. Yes, it is, this is an area that is essential to the water resources field.

Mr. ASPINALL. That is all.

Mr. ROGERS. Do you have any more questions?

Mr. BURTON. No, sir.

Mr. ROGERS. Thank you very much, gentlemen, for your contribution. The subcommittee will stand adjourned subject to the call of the Chair.

(Whereupon, at 11:45 a.m., the hearing in the above-entitled matter was adjourned, to reconvene subject to the call of the Chair.)

4/14/63

WATER RESOURCES RESEARCH CENTERS

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HEARINGS

BEFORE THE

SUBCOMMITTEE ON IRRIGATION AND RECLAMATION

OF THE

COMMITTEE ON INTERIOR AND INSULAR AFFAIRS HOUSE OF REPRESENTATIVES

EIGHTY-EIGHTH CONGRESS

FIRST SESSION

ON

S. 2, H.R. 2683, H.R. 2689, H.R. 4048, H.R. 7234,
H.R. 7239, and H.R. 7258

BILLS TO ESTABLISH WATER RESOURCES RESEARCH CENTERS AT LAND-GRANT COLLEGES AND STATE UNIVERSITIES, TO STIMULATE WATER RESEARCH AT OTHER COLLEGES, UNIVERSITIES, AND CENTERS OF COMPETENCE, AND TO PROMOTE A MORE ADEQUATE NATIONAL PROGRAM OF WATER RESEARCH

SEPTEMBER 30 AND OCTOBER 1, 1963

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WATER RESOURCES RESEARCH CENTERS

MONDAY, SEPTEMBER 30, 1963

HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON IRRIGATION AND RECLAMATION
OF THE COMMITTEE ON INTERIOR AND INSULAR AFFAIRS,
Washington, D.C.

The subcommittee met at 9:45 a.m. in room 1324, Longworth House Office Building, Hon. Wayne N. Aspinall (acting chairman of the subcommittee) presiding.

Mr. ASPINALL. The Subcommittee on Irrigation and Reclamation will now be in session for receiving further testimony on Senate bill No. 2, which has received the approval of the other body and is now before this committee, and kindred House bills which are before the committee.

In the absence of the gentleman from Texas, Mr. Rogers, chairman of this subcommittee, the chairman of the full committee will take care of the chairing of the sessions today and tomorrow at his request.

Hearings were held on this legislation on June 24 and 25 and July 22 and 23 of this year, at which time representatives of the various departments and agencies of Government were heard.

The Chair wishes to explain as we begin the hearings that he is very appreciative of the fact that we do have present this morning the members who are in attendance.

This is one of those weeks which could not have been foreseen, so many of our members have left the city and are out in their districts, or in somebody else's districts, taking care of their individual and mutual responsibilities. When a session of Congress goes into the fall as long as this one has it is almost imposible to hold hearings on bills as they should be held.

This morning and this afternoon we will hear from representatives of the universities.

The first group we will hear is headed by Dr. William E. Morgan, president of the Colorado State University and chairman of the Water Resources Committee, Association of State Universities and Land-Grant Colleges.

I shall advise my colleagues that Dr. Morgan is president of the university which by recent action made me an honorary alumnus and I am really very proud to have the doctor here.

He is accompanied by Dr. E. F. Osborn, vice president for research, Pennsylvania State University, Dr. Ralph B. Draughon, president, Auburn University; Dr. E. T. York, provost, University of Florida, presented to us a while ago by our colleagues Billy Matthews; and Dr. Daniel G. Aldrich, chancellor, University of California at Irvine.

As I understand it, Doctor, there will be a statement made at the conclusion by you.

Unless there is an objection we shall hear your presentation before there is any questioning of any of you.

Without objection it is so ordered.

Dr. Morgan, we will proceed under your direction.

STATEMENT OF DR. W. E. MORGAN, PRESIDENT, COLORADO STATE UNIVERSITY, AND CHAIRMAN OF THE WATER RESOURCES COMMITTEE, ASSOCIATION OF STATE UNIVERSITIES AND LAND-GRANT COLLEGES

Dr. MORGAN. Thank you, Mr. Chairman and members of the subcommittee.

I am pleased to represent the Association of Land-Grant Colleges and State Universities in this presentation today.

As you have indicated to the committee, we come as a team, so to speak, with what we hope will be an integrated presentation.

Each of us has a prepared statement and sufficient copies to be filed with your subcommittee.

We do not plan, however, to read these statements in full.

Rather, in the interest of conserving your time, it is our expectation to summarize, each of us in turn, the contents of our presentations, hopefully so that we may answer in advance some of the questions that you have; and, of course, we hope we will be able to respond adequately to the questions that you do ask.

Mr. ASPINALL. Did you say you would like to have the manuscript in the record and you would speak orally from its contents?

Dr. MORGAN. Yes, sir.

Mr. ASPINALL. Without objection the statement of Dr. William E. Morgan will be printed in the record at this point.

(Dr. Morgan's statement follows:)

My name is William E. Morgan. I am president of Colorado State University which is the land-grant institution in the State of Colorado. My appearance here is in the capacity of chairman of the Water Resources Committee of the Association of State Universities and Land-Grant Colleges. I wish to thank the committee in behalf of the 72 universities and colleges comprising the membership of the Association for this opportunity to speak in their behalf in support of H.R. 2683 (and companion measures H.R. 2689, 4048, 7234, 7239, 7258 and S. 2) known as the Water Resources Research Act.

The association I represent endorses, by virtual unanimous vote of its membership, the purposes and objectives of this bill. If your committee desired, a representative from each of these institutions would appear before you in support of the association's stand. In lieu of that, our association is represented here today by personnel from five of the member institutions. I should like to introduce these gentlemen and indicate the portion of the association's testimony which each is prepared to present.

First we have the vice president for research at Pennsylvania State University, Dr. E. F. Osborn, who will discuss some of the scientific and engineering needs for research in areas related to water.

Next we have the president of Auburn University, Dr. Ralph Draughon, who will touch on the subject of national requirements for trained manpower and what this bill might do to further the development of that critical resource.

Then there is the provost of the University of Florida, Dr. E. T. York, who is prepared to comment on the funding proposals in the bill.

Next we have the chancellor of the Irvine campus of the University of California, Dr. Daniel G. Aldrich, Jr., who is to comment on some of the Federal-State relationships involved and who, in discussing some of the bill's potentials,

will draw on his experience in a State that has already put forth much effort on research related to water.

Finally, I should like to conclude with a statement on water as a public resource.

We are especially grateful to the committee for permitting us to deal with the subject in such extended fashion, and now I should like to open our testimony with a background statement on developments that bring us here today as representatives of the Association of State Universities and Land-Grant Colleges.

Every activity of man, every facet of industry, leaves its influence on the water resource. Water, like sunshine and air, is fundamental to life itself, and the right of the individual to enjoy unpolluted water necessary for the essentials of life and health is today more than just a license. Water is a major concern of civilized society. "The story of water is the story of man."¹ As every informed person knows, the demands upon the water resource are rapidly multiplying and, in an area embracing nearly one-third of the United States, 1980 demands will exceed the supply.²

The rather sudden national awareness of an impending water shortage has naturally led us to talk more and more about water research. Research is today a base for our general welfare. We have found research to be the key to the most productive agriculture of all time; to greatly improved health; to a viable, productive, modern industry; to national security; to an extension of our environment beyond the earth's atmosphere, and to many other desirable objectives. Thus, it is only proper that we should turn to research for assistance in stretching our limited water resources to the limit.

RECENT COMPILATIONS OF WATER RESEARCH NEEDS

An early publication which recognized the desirability of research on water was the U.S. Department of Agriculture Yearbook for 1955 entitled "Water." This publication included discussions of 91 topics relating to the use of water. These are primarily of interest to agriculture, but, in many cases, are of wide general interest, also. I do not think this publication was designed to be simply a research report, yet the discussion of every topic includes major reference to the results of research.

In 1961 the National Reclamation Association and the National Association of Soil Conservation Districts held a national water research symposium in Washington, D.C. Scientists, engineers, and public officials of national stature in the field of water resource development and use reported research needs. These reports were later published as Senate Document No. 35, 87th Congress, 1st session, and fill 235 pages.

The extensive study of the Senate Select Committee on Water Resources, 86th Congress, brought a new and realistic perspective to the water resource picture but stressed the importance of research. The impacts of the various water needs were weighed against the supplies, and local and regional differences were considered in detail. The reports of this study did much to "clear the air," and they quite clearly show the critical areas, not only geographically, but in terms of technology and public policy as well. While the urgency varies, the need for action is evident in all regions and for all kinds of uses, but it is clear that intelligent planning, cooperative action, continuing assessment of problems, and positive steps or incentives to encourage efficient use, backed up by research, can greatly extend our capability to match demands with supplies. Much of the report, which consists of 32 separate papers, is concerned with research. Indeed, the report itself is the result of research. Print No. 28 written by the Department of Agriculture is entitled "Water Resources Research Needs" and discusses a great many specific areas of research. Ten other prints, Nos. 21 to 27 and 29 to 31, are primarily reports of research accomplished, of future research needs in specific areas, and of the possibilities for application of research results in these areas. These reports thus quite comprehensively cover the research picture and should be "required reading" for those concerned with water research programs. It would be quite unlikely that I would add anything new to this vast cataloging of research needs. Hopefully perhaps some emphasis might be given to certain aspects of research, especially in rela-

¹ Bernard Frank in "Water," U.S. Department of Agriculture Yearbook, 1955.

² "A Better Gage of the Water Outlook," annual report, Resources for the Future, Inc., Washington, D.C., 1960, pp. 14-24.

tion to the concept of State research institutes as visualized by H.R. 2683 and companion measures.

The summary report of the select committee³ emphasizes research. On the basis of the results of the study, five recommendations were made. Recommendation No. 3 requested a coordinated program of water research, and in discussing this recommendation, the committee stated its belief "that a great deal more research and demonstration is needed on almost all phases of water resources." Deficiencies in present research programs were discussed in some detail. In part II E, section 4, the committee delineated and discussed 17 specific research areas.

In May 1962, the chairman of the Committee on Interior and Insular Affairs of the U.S. Senate asked for reports on water resources research from the Federal departments, land-grant colleges, and State universities, other public, educational, and private institutions, and individuals in each of the 17 categories of research suggested by the Senate select committee. The results of these inquiries are summarized and appear in a committee print⁴ of the 87th Congress, 2d session. The contributions of the land-grant and State universities and other institutions illustrate the broad base on which important water research is already founded as well as emphasize the fact that many educational institutions are already contributing significantly to the effort in water resources research. Table 1 summarizes these contributions.

TABLE 1.—*Land-grant universities, agricultural experiment stations, and other institutions engaged in water resources research*

Categories	Land-grant universities	State agricultural experiment stations	Other institutions ¹
(a) Evaporation reduction.....	19	-----	3
(b) Phreatophytes.....	14	-----	2
(c) Evapotranspiration reduction.....	24	19	7
(d) Reduction of wasteful irrigation practices.....	21	9	5
(e) Waste treatment and control.....	31	-----	14
(f) Waste water salvage.....	8	3	5
(g) Industrial water conservation.....	10	-----	8
(h) Desalting.....	11	1	6
(i) Weather modification.....	17	-----	2
(j) Hydrometeorologic forecasting.....	17	25	8
(k) Application of nuclear products.....	9	2	6
(l) Ground water use and control.....	27	16	7
(m) Economic incentives.....	2	-----	-----
(n) Alternative water use.....	8	-----	1
(o) System planning.....	9	-----	5
(p) Economic effects of existing projects.....	19	-----	5
(q) Engineering problems.....	15	-----	10

¹ This column includes State universities other than land-grant, private universities and foundations, institutes, and corporations. While all land-grant universities and State experiment stations were doubtless canvassed, conceivably there could have been omissions in the canvass covering other institutions. It is likely, also, that some research efforts of agricultural experiment stations were not distinguished from the associated land-grant universities.

INTEREST OF STATES IN WATER RESEARCH

It would appear that the need for increased water research and the broad areas in which this need occurs are quite well established. The question is, What shall be done first and who shall do what? In a paper given at Chicago in 1962,⁵ Edward A. Ackerman said: "The problem of the States is not as to whether there is research for them to undertake but as to what they choose among all there is to do." Ackerman suggested that the States should consider those research needs that are particularly suited to attention and initiative on the part of State governments. He pointed out the great differences between the

³ Report of the Select Committee on National Water Resources pursuant to S. Res. 48, 86th Cong., together with supplemental and individual views, committee print, 87th Cong., 1st sess., S. Rept. 29, Jan. 30, 1961.

⁴ "Water Resources Research," memorandum of the chairman to the Committee on Interior and Insular Affairs, U.S. Senate, September 1962.

⁵ "Water Research Needs," Edward A. Ackerman, Carnegie Institution of Washington, address before Interstate Conference on Water Problems, Chicago, Ill., Dec. 4, 1962.

social and natural environments that exist in the various States and suggested that the determination of what research needs are "starts with politics and policy." Ackerman asked: "What are reasonable objectives for the development of the State in the future? Is it maximizing employment? Or income? Is it creation of an economic base to attract a greater number of residents? Or is a determined effort needed to preserve action to prevent deterioration of resources and amenities? Even in these few questions a distinction can be seen between the proper objectives of Alaska, California, West Virginia, or South Dakota."

Ackerman did not suggest any other restrictions on the type or subject matter of the research to be done by the State, nor did he discuss the possibility for coupling the research with programs of education, as is anticipated by H.R. 2683 in providing for establishment of research centers at universities. In a university context, part of the research done should be basic.

Linking research and education adds vast new dimensions to the potential of the proposed effort. One of the overwhelming reasons for a university connection relates to the development of manpower, both in terms of numbers and in quality of their education. This manpower subject will be discussed in detail by one of my colleagues so I will restrict my remarks on it to some limited comments later on and return to the question of why State water resource centers are needed. Why should part of the water research effort be undertaken at State levels rather than exclusively by Federal agencies?

One important reason already suggested stems from the large differences that exist among the States. These differences involve not only great variations in the nature of the resource itself and the degree to which the resource has been developed, but also in the detail of the economic and social structure. These differences are reflected in the political and policy aims of the various States.

The differences in the resource and the degree and nature of its development were pointed out by the reports of the Senate Select Committee on Water Resources, especially by prints Nos. 6 and 32. As an example, many Western States, limited in their water resources to begin with, have placed great pressure on the resources because of the steady demand for irrigation. The availability of dilution water for pollution control and for cooling, already low, bears a further reduction because of the high consumptive use of irrigation. On the other hand, water transportation is not a significant factor in most Western States. The significance of water in recreation is primarily in maintaining the attractiveness of the vast areas of unoccupied watersheds. The consumptive use of the water resource is approaching a practical saturation limit so that new uses essential to economic development must occur in most instances at the sacrifice of some present use. In contrast, a typical Eastern State might have a primary interest in maintaining river navigation. Waste dilution demands and pollution become the significant factors dominating allocation of streamflow rather than consumptive use for irrigation. Irrigation is limited and sporadic, depending on season. Recreational use of unoccupied land is quite limited and direct utilization of water for fishing, boating, etc., is relatively more important in the recreational picture.

The differences between even adjoining States are apt to be greater than one might think. Utah's development is mostly based on the short, snow-fed streams of the Wasatch front discharging onto the desert floor. This has resulted in the development of rather small, generally independent irrigation units. Next door, Idaho's streams are larger; occurrence of ground water in fractured lava is common. Differences in climate, elevation, and soil have generated significant differences in problems of agricultural use of water. In neighboring Wyoming there are many scattered irrigation developments, often associated with ranching and fairly large irrigation projects principally on the North Platte and its major tributaries. One could continue to recite these resource differences in detail.

The differences in the economic-social detail as among States may even be greater than the resource differences. The particular lines which future economic development may take are highly unique State by State. These are greatly influenced by the nature of natural resources, other than water, such as minerals, fuel, and timber (including their accessibility, and their quality in relation to competitive sources, etc.); by transportation; by the nature of the population resource (such as degree of urbanization, geographical distribution, and nature of occupational capabilities and social background); by educational activities; by the administrative and legal structure; by taxation practices; by

the availability of markets; by recreational resources; by strategic resources; by Federal interest in public lands; and by many other factors. These differences lead to unique and different policies and objectives.

The position of the State in the check-and-balance action which ought to be characteristic of the total development of the water resource is highly important. The State must speak for the individual and the community. It must be concerned with the fine-grained synthetic problems of matching resources, people, and economic objectives, enterprise by enterprise and community by community. In contrast to Federal agencies in the field, which are often dedicated to single functions or missions in a sort of vertical array, the State has the responsibility to provide a positive environment whereby economic elements, of which water is an important one, may be melded at the grassroots level in a horizontal sense, somehow consistent with the overall economic and social aims of the statewide community and the coordinate objectives and policies of the Federal Government. This is not to overlook or minimize the great responsibility of the Federal Government in water resources, but to point out the importance of the role that the State should play. That the Senate select committee was conscious of the balancing role of the States, as well as of the Federal responsibility, is quite evident from its reports. In its summary report⁶ the committee listed eight areas in which action was needed to meet national goals. Area No. 3 was improvement of State and local planning and decisionmaking. Pointing out that most water problems will continue to be local or regional, the committee stated that, "Broadly speaking, national problems are the sum of large numbers of regional and local problems." The committee noted that "State and local agencies still play a minor role in many water resource decisions * * * the State and local agencies are in the position of having to approve or disapprove plans without having made comprehensive background studies which are needed before a major decision in the water resource field can be made."

The committee suggested Federal assistance to States for a limited period in order that they might develop capability for comprehensive long-range plans for optimum development of water resources within the State. It is doubtful if such plans could be effectively made without research on problems that are specific and often unique to them. Certainly assisting the States to establish water resource research centers is consistent with this particular recommendation of the committee and within the Federal responsibility as visualized by them.

A third reason for establishing the State centers as visualized by H.R. 2683 is the broad linkage which this establishes with education. It is in this way that the educational effort might become exponential; that is, like a chain reaction, students associating with research and researchers are more apt to become researchers themselves. Graduate students can contribute to research; research employment may make graduate study attractive. In many instances such employment is the only means of inducing a promising student to undertake graduate work. From the point of view of practice, students educated in a research environment will be more knowledgeable, their judgments will be better than otherwise. Regardless of the amount and quality of research information available, this can have no impact upon the water resource except through the myriad elemental decisions made daily by a great many people. It is important that the knowledge and wisdom of these decisionmakers at every level be as great as possible. I would expect that the impact of establishing the proposed centers at universities, in terms of improved operational decisionmaking, might well be as great as the research knowledge itself.

Mr. ASPINALL. You may proceed, Doctor.

Dr. MORGAN. The association which I represent endorses, I would say by unanimous action, the purposes and objectives of this bill.

As you have indicated, the team of individuals representing these institutions will appear in sequence. I would like to review again their names. There is one of them whose title I can straighten out.

Following my own introductory statement we shall have Dr. E. F. Osborn, vice president of research, Pennsylvania State University; then Dr. Ralph B. Draughon, president, Auburn University, who will testify on what this bill will do in the manpower resources field; then

⁶ Ibid., p. 3.

problems on agriculture, the University of Florida, Dr. York, who will comment on the funding proposals of the bill; then the chancellor at the University of California at the Irvine campus, Dr. Aldrich, who will comment on some of the Federal-State relationships involved, and who also will comment on what a State like California, already far advanced in its effort on water research, is doing and what it might do under this bill.

Finally, I have a concluding statement to make.

My statement, which has been filed with you, begins by compiling a rather imposing list of water research needs. It draws on reports from the U.S. Department of Agriculture, from the National Reclamation Association, the National Association of Soil Conservation Districts, extensively from Senate Document 35 of the 87th Congress, reports of the Senate Select Committee on Water Resources of the 86th Congress.

Frankly, it would be futile to try to add anything new to this vast cataloging of research needs.

Particular attention is called in this report on the select committees to the interest it places on research.

Mention is made of one of the recommendations of the select committee having to do with the coordinated program of water research and it is our expectation that you shall have questions in that area for sure. It is a subject in which we are also vitally interested.

The compilation of research which has been undertaken in the land-grant institutions and the State universities surveyed appears at the table on page 4 of the statement where a long list of categories of research is presented, and there is an indication of the number of institutions whose research inquiries look into these various categories.

It raises next the question of what shall be done first and who shall do what in water research.

Quoting from Mr. Edward A. Ackerman, he says:

The problem of the States is not as to whether there is research for them to undertake but as to what they choose among all there is to do.

Linking of research and education, which adds a vast new dimension to the potential of the proposed effort, is treated in this paper.

The question is asked "Why should water research effort be undertaken at State levels rather than exclusively by Federal agencies?"

The answer given in the statement follows the line of reasoning that points out the large differences that exist among the States and the differences reflected in political policies of the various States.

Here I would like to read a paragraph from the statement which seems to emphasize the varied complexities of the pattern as we look at it on a nationwide basis but zeroing our sights in State by State. [Reading:]

The differences in the economic-social details as among States may even be greater than the resource differences. The particular lines which future economic development may take are highly unique State by State. These are greatly influenced by the nature of natural resources, other than water, such as minerals, fuel, and timber (including their accessibility; and their quality in relation to competitive sources, and so forth); by transportation; by the nature of the population resource (such as degree of urbanization, geographical distribution, and nature of occupational capabilities and social background); by educational activities; by the administrative and legal structure; by taxation practices; by the availability of markets; by recreational resources; by strategic resources; by Federal interest in public lands; and by many other factors. These differences lead to unique and different policies and objectives.

It calls attention to the check-and-balance action and how important that is.

The State must speak for the individual and the community.

The statement closes by reiterating the importance, as we see it, of the State centers as visualized by this bill, affording the broad linkage with education. In this way the educational effort really becomes a chain reaction.

This leads, Mr. Chairman, to the specific comments of the second person on our team I would like to introduce to you and ask him to summarize the observations that he has on the subject of training manpower and what this bill might do in the development of that critical resource.

I am out of phase here. Before getting to that I would like to ask Dr. Osborn, vice president for research at Pennsylvania State University, to discuss some of the scientific and engineering needs for research in areas related to water.

STATEMENT OF DR. E. F. OSBORN, VICE PRESIDENT FOR RESEARCH, PENNSYLVANIA STATE UNIVERSITY

MR. ASPINALL. Without objection, we shall insert Dr. Osborn's statement in the record.

(Dr. Osborn's statement follows:)

SCIENTIFIC AND ENGINEERING RESEARCH NEEDS

INTRODUCTION

The present and future water resource situation in this country has been dramatized both at the local and national level. From a technical viewpoint the future does not look bright because of the rapid rate at which new demands are being placed on our water resources and in view of the myriad of technical, social, and economic problems that must be solved through basic and applied research. Answers are not now available and not likely to be available in the immediate future under our present scale and scope of research effort. Decisions in the national interest must be made taking into consideration various social, economic, political, and engineering factors as well as all of the pertinent elements of the hydrologic and geologic environment. The public has been made increasingly aware of the national situation by the reports of the Senate Committee on National Water Resources, by the activities of National, State, and local water resources agencies, conservationist and other groups, and by the citizen's firsthand knowledge of water resource problems that they have encountered in their backyard.

A great host of problems in water resources, a few of which have been enumerated in reams of testimony have remained unsolved because of their very complex nature. These areas provide a stimulating challenge to hydroscintists and will require the highest level of technical competence on the part of investigators. Men with a high degree of specialization will be needed to make breakthroughs in water resources research problems. Coordination of efforts, on the other hand, will require men of great insight and broad scope. Their responsibilities will be to bring together the right blend of talent and create the proper research climate. At present this is being done only at a few centers because of the workload, lack of trained personnel, lack of funds, and in some cases because of tradition which limits defined areas of responsibility.

The Federal Government should assume a position of leadership to insure that legal machinery is provided and set into motion and that financial support is made available to stimulate an active, effective, and broad scale research endeavor in the water resources field. Much of the research in hydrology and in related fields was accomplished in an unfavorable research climate. This Nation cannot afford to let insights and creative acts remain unborn; the innate curiosity of man, a basic prerequisite in science, represents a neces-

sary spark which, if kindled, will provide solutions to many of our water resource problems. The Senate Select Committee on National Water Resources and its predecessors have recognized the need for research in the water resources field as have scientific and technical personnel of Government and private agencies and universities. A vehicle has been provided, the Water Resources Research Act now under consideration, by which research needs can be realized. Universities, colleges, and other organizations are also meeting their responsibilities through administrative reorganization in a direct attempt to allow for and stimulate increased interdisciplinary research in diverse areas and to provide an educational climate which favors group effort when dealing with complex problems.

Why is this act necessary? Consider for a moment the diverse elements of any well organized water resource, evaluation, development, and management program. At every turn there is need for basic research and new technical developments to provide answers to a host of complex unknowns.

TOTAL WATER INVENTORY

Rational development, management, and conservation of water requires a detailed knowledge of how and where the resource is distributed. The great atmospheric reservoir contains an immense amount of moisture in transport or storage. It has been estimated for example, that approximately 2,000 billion gallons of water pass over the State of Illinois daily in the atmosphere in the form of clouds or unseen vapor while only about 5 percent of this moisture (99 billion gallons) falls on the land surface in an average day. There are problems associated with the measurement of this moisture to determine its distribution in time and space. Such studies are of great value particularly as it may be possible to stimulate the precipitation of moisture from the atmosphere. This has already, of course, been tried through cloud seeding. Other techniques are possible. The total amount of water introduced into any area must be determined whether it be into a drainage basin or a subsurface aquifer network, or into a political unit such as a county. One element of an inventory program is the measurement of rain, snow, dew, sleet, hail, ice crystals, and hoarfrost to determine the amount and frequency of precipitation, excessive amounts, the duration, intensity, and frequency of storms, dry periods, and the detailed geographic factors which influence precipitation. Improved instrumentation and techniques should allow for the widespread use of remote control data retrieval systems which will allow data to be collected at more numerous stations. These data are necessary in detailed water resource evaluation studies and in basic climatological studies. Further investigations are required to relate temperature to precipitation, potential to actual evapotranspiration under various land use practices and under varying field conditions, and to new methods of controlling evapotranspiration losses which include evaporation suppression methods, crop and forest management practices, and the control of ground water levels.

Research is needed to improve on hydrologic predictions in climatological events. At present these predictions are based on statistical interpretations of a minute sample of climatic data which dates back about 100 years and streamflow data for about 50 years. Hendricks (1962) states that these data show considerable variability and are inadequate to define past or future distribution of hydrologic or climatic events. Through research it should be possible to extend our records backward in time through paleoclimatological studies involving the use of historic events, geochronologic and dendrochronologic and geologic evidences. These studies should provide an indication of climatic changes which are of direct concern to man. Hendricks further states that research is needed to improve statistical methods to determine whether cycles or trends can be defined. By means of statistical methods now becoming available it may be possible to separate individual components of time series to define the variations attributed to each cycle and to determine their combined variability.

Evaporation and transpiration studies require detailed information on atmospheric conditions where energy budgets are used. Instrumentation presently available for measuring the received and the reflected energy supplied by solar radiation and advection is inadequate to determine evaporation from surface water bodies for short periods of time. Research is required to develop and test mass transfer techniques which should be applicable to determining evapotranspiration losses from land surfaces.

Another major element in any total water inventory is the amount of surface water inflow and outflow from an inventory region. Our present stream gaging network and methods of gaging must be improved and extended to study the distribution of surface water in more detail, to locate regions within drainage basins from which ground water discharge is derived and thus define those areas in which water is available for exploitation. Methods of hydrographic analysis must be improved to aid in the evapotranspiration studies, bank storage studies, and to determine the influence of land and water use practices on streamflow.

Surface water resources must be considered from the availability standpoint; namely, the distribution, quality, and potential of natural streams, lakes, and springs. Usability of surface water resources depends upon quality which is influenced by seasonal variations in rainfall and runoff. Usability also depends upon physical and economic factors which are related in turn to the availability of reservoir sites, the life of reservoirs, the long-term changes in surface water quality, upon costs of treating water, and upon alternate uses of surface water and waterways. Engineering studies are necessary to provide guidelines for multipurpose future construction projects. These studies might be based on existing works and should attempt to determine their influence upon the economy of the area. Research is required to determine the interrelationship between surface water and ground water reservoirs under natural conditions and under conditions of development, because development of surface waters affect the source of recharge or discharge from ground water reservoirs while surface water reservoirs are in turn affected by ground water utilization. Studies must be made on water use requirements of various industries to encourage industrial development in new areas with great potentials, improve on plant facilities to conserve on water, on the design and improvement of facilities for the reuse and plant treatment of waste water, and for the reduction of losses of water in plant processes.

Research must be continued to define the relationship of watersheds to geology, climate, physiography, biota, and changes in land use as they affect erosion of topsoil, accumulation of sediment in channels and reservoirs, quality of surface and ground water and the relationship of aquatic and other plants to channel characteristics, and water quality. In fact a whole new research area of biohydrology must be stimulated in an attempt to evaluate in more detail the role of organisms on the quality and quantity of water available in various segments of hydrologic cycle; biologic processes produce new organic matter which undergoes physical and chemical changes in and above the soil and in water courses. New materials, in the form of organic and inorganic wastes, change the rate of plant productivity and thus change water quality. Vegetative cycles, which manifest themselves in blooms of algae and water weeds in our water courses must also be understood as they influence small streams and lakes from the quality and recreation point of view, and in the quantities of water available. More has to be learned about water use by plants, elements taken up by plants, and the influence of soil microflora on water quality.

New treatment facilities and techniques must be designed to combat the pollution and contamination of surface water and ground water by heat, sewage, organic waste, mine tailings, chemical wastes, irrigation runoffs, radioactive wastes, and sediments. Much has to be learned about the response of watersheds to urbanization and industrialization. This will require a considerable research effort in order to provide guidelines for regional water resources planning and zoning aimed at maintaining high water-quality standards. Specifications for domestic, community, and industry waste disposal and treating facilities must be revised to take into account varying hydrologic and geologic conditions. Sewage treatment plants must be modified to handle diverse types of wastes and watershed management schemes must be devised to allow for dilution and storage of wastes and for minimizing contamination resulting from abandoned mines, oil and gas wells, salt water encroachment, and induced infiltration of poor quality water.

Ground water storage and ground water inflow and outflow must be taken into consideration in water budget studies, in undeveloped areas as well as under conditions of maximum development. Consideration must be given to subsurface storage facilities, the presence of surface water reservoirs, maximum utilization of subsurface water, and to the rate of ground water recharge.

Aquifer networks and their relationship to recharge and surface water bodies are known in detail in only few areas in this country. It is not enough to define the hydrologic and geologic parameters of aquifers; in addition it is necessary to know how aquifers respond to development and to changes in land use practices. This response cannot be determined in areas with complex geohydrologic systems by presently available mathematic techniques even with the aid of high speed computers. Electrical analog models, capable of simulating all elements of the hydrologic cycle, may provide the answer. All but the simplest models are costly, however, and will require investigations aimed at reducing their costs. In areas of limited ground water development, basic data are scarce. Additional research is needed to develop new approaches in describing poorly known geologic environments in quantitative terms so that trial models can be constructed which will provide approximations of the ground water conditions of these areas.

Studies will be required of detailed stratigraphic, geophysical, and hydrologic features to define precisely the nature and distribution of permeability, and of hydrologic boundaries, the nature of water movement within and between the units, and the relation between water-yielding characteristics and the geologic history and mineral composition of aquifers. Recharge and discharge phenomena of aquifers must be determined under the influence of depressurizing and dewatering. Detailed studies are necessary to relate water quality and quantity to geologic structures, topography, climate, rock type, recharge, the influence of evapotranspiration losses, irrigation practices, land use and land management practices, and to the influence of mining, oil, and gas developments and waste-disposal practices.

Type areas should be selected within various hydrologic environments in which to develop and evaluate methods of studying the numerous relationships discussed above. By concentrating research funds and effort in carefully selected areas new methods and an increased body of knowledge should be obtained which will be applicable to regional studies.

Considerable work remains to be done to understand ground-water recharge. In particular how the type, distribution, and character of soils and plant cover and the distribution, nature, and frequency of precipitation influence recharge rates as well as water temperature and quality. The effects of land cultivation and deforestation on permeability and recharge must also be investigated. Ultimately it should be possible to increase natural recharge through sound land use practices, zoning restrictions, and artificial recharge by program pumping near lakes, rivers, and springs; by pumping to intercept rejected recharge; and by a host of other artificial recharge means.

CURRENT AND FUTURE DEMAND FOR WATER

A host of variables must be investigated to determine factors that influence present water use patterns for domestic, industrial, irrigation, recreation, waste dilution, navigation, and wildlife management purposes. Only if these variables are understood will it be possible to predict trends in water use which are necessary in water resources planning. For example, more has to be known about the following: Water use and withdrawal for public and private water; disposal methods and requirements; social, economic factors influencing water use; system conditions and pricing which influence trends in water use; efficiency of distribution and use of water; performance of engineering works; past and current trends in water use; quality requirements for various purposes; aerial distribution of wells and septic tanks. From an irrigation standpoint, the value of water for irrigation must be considered in competition with other demands.

Investigations are necessary to determine the current levels of recreation use of water, possible future requirements, and the relationship between recreation and alternate water demands. These factors must be known in order to plan for multipurpose water resources development.

Waste dilution also places a demand on our water resources. The need for water for these purposes both present and in the future must be appraised. New methods of waste disposal and new treating facilities are needed.

More has to be known about flood control programs, their effect on recharge, and the relationship between planning watersheds for flood control purposes and for many other purposes.

DEVELOPMENT AND MANAGEMENT OF WATER RESOURCES

In most areas water development practices are more random than is economically desirable from efficiency, conservation, and multiuse points of view. Commonly water management practices treat only segments of the hydrologic cycle rather than the total water resource. This shortcoming is due, in part, to the fact that the total water resource has not been defined, the cause and effect relationships of geohydrologic systems are not well understood, or because there are no truly comprehensive water resource plans available. Parizek (1963) states that, "to be most effective comprehensive planning assumes that all the elements of the physical systems are known and well enough understood by planners or their advisers so as to be realistically considered in planning. Unfortunately this is not yet the case." Comprehensive plans must be flexible enough to assimilate new developments as they become available. Urbanization, industrialization, recreation, farming, droughts, and biologic activity are but a few examples of causes of change, while falling water levels, sinking ground levels, aquifer contamination, compaction and settlement of confining beds, decreased streamflow, and removal of water from storage are a few of the better known hydrogeologic responses.

Additional research is necessary to provide guidelines for management of water in all of the hydrologic cycle's great reservoirs. Water-management plans must include stream pollution abatement, routing and utilization of storm water, climate modification, evaporation suppression, and the design and utilization of storage facilities. Efficient ground-water management requires data on techniques to accelerate recharge rates under natural conditions and by artificial means, data on well construction and development practices to improve well yield, on well location and spacing under varying field conditions, on conditions necessary to prevent pollution and contamination of subsurface reservoirs, on the use of poor-quality ground water, and on the renovation and reuse of water.

Management practices for shallow and deep aquifers require different approaches. Parizek (1963) states "dewatering shallow aquifers is highly desirable in certain places, to induce infiltration of surface water during times of flooding, to minimize natural ground-water discharge, or to intercept rejected recharge water. Dewatering of deep aquifers on the other hand may only reduce their capacity to transmit water from their recharge area to the area of pumpage."

WATER RESOURCES LAWS

In many respects our present water resource laws are out of date and will have to be revised in order to promote the optimum use and development of our water resources, to protect this vital natural resource against costly damages such as silting of reservoirs and pollution of ground-water reservoirs and surface-water bodies. Ground-water reservoirs do not always respond uniformly to development and logically should not be encompassed by a single law controlling the development or appropriation of all ground water. Some aquifers have considerable storage but little if any recharge while in others the reverse is true. Conover's point (1961) is well taken, that by proper management a dependable supply of water can be developed on a perennial basis only from aquifers that have significant annual recharge. Laws governing aquifers with limited recharge may deal with the mining of ground water, contamination by encroachment of underlying brackish or saline water, land subsidence, etc. Shallow aquifers, on the other hand, may be connected freely to surface water reservoirs where development or contamination of one may directly influence the other. Other laws are necessary to control the use of water, to aid researchers in water resource evaluation studies, and to maintain a high competence of water well drillers. Driller's acts are required for the purpose of obtaining samples and records of subsurface materials, necessary in water resource studies. Laws are needed to protect the quality of subsurface water and to govern the allocation of water for numerous legitimate purposes.

CONCLUDING STATEMENT

More can be said about many other areas in which basic and applied research is necessary in the water resources field. One might ask why all this research is necessary. The question is asked by many public officials responsible for the use of public funds and by people who are unaware of our water resource

problems. It is here proposed that expanded water resource research, to include both applied and basic research, represents a wise use of public funds and, in fact, an indispensable one at this time in our history. Those who are unaware of our water resource problems are creatures of habit who turn on the faucet and always obtain water or live in a watershed where there is a great abundance of water. They do not realize that the watershed provides water for alternative uses at other points in the basin or that rapid changes in water quality are taking place. Water levels in aquifers fall slowly for tens of years or streams are gradually polluted and finally the creature of habit becomes angry when the supply is exhausted or his trout stream is polluted. The Water Resources Research Act together with continuing financial support of all other water resource agencies, both public and private, will do much to help solve in time many of the problems that have been enumerated here and elsewhere. The present bill is not on a crash program scale. Nevertheless, it will provide the necessary funds to stimulate and encourage a vigorous and effective research effort at many centers, providing that the funds are sustained. Many of the complex problems cannot be solved by a crash-program effort, because time is required to collect the necessary data. New men must be trained who have research capabilities and the results of our research effort must be added to our pool of knowledge before a host of unknowns can be assimilated into an integrated end result which can serve this Nation's well being.

Individual research centers cannot provide all of the answers to problems mentioned above, but the Water Resources Research Act will stimulate research and result in better use of the special and diverse talents of individuals, varied research facilities, and library facilities, and will promote the training of men by providing inservice experience for potential scientists and technicians. Research centers must enjoy cooperation and free exchange of data with existing water resource agencies.

Universities and colleges recognize that they have a responsibility in this research effort which they can execute with the assistance of the legislative and administrative branches of government.

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Dr. OSBORN. Thank you, Dr. Morgan.

Chairman Aspinall, members of the committee, I appreciate the opportunity to appear at these hearings and to enter into discussions of this bill which would provide certain funds for water research.

Water is essential to our existence and without much doubt is our most valuable mineral resource. This is true, I believe, even in my home State of Pennsylvania, despite our huge coal and other mineral resources.

Fortunately, and unlike coal and oil, water is a renewable resource which has only to be managed properly.

Although we have an abundance of water in many of our States, the quality is deteriorating and management of the supplies is in an elementary state.

Like several others of the land-grant institutions, the Pennsylvania State University has awakened to the need for research in this field and has a rather extensive water research program underway.

This bill, particularly title I, would be a great help to these institutions with ongoing programs in their effort to learn the basic and applied facts which are needed for intelligent use of this great natural resource, and it would be an immense stimulus to other institutions to move on these water problems as they affect their areas.

In these land-grant universities and colleges there are competent people, and the internal organizations which can provide coordination.

These institutions have accepted Federal funds for many decades and have demonstrated a truly remarkable ability of getting results while handling funds in an entirely trustworthy and responsible manner.

They have further learned to cooperate with one another on their research to avoid unnecessary duplication and to exchange results.

What are the scientific and engineering needs which would be studied with funds provided by this bill? Some aspects are discussed in a prepared text which I should be glad to provide for the committee.

With your permission I should like to read an abstract of this.

One important element in any well organized program of water resource and valuation, development, and management is that of total water inventory. We need to know amounts, distribution, and quality of water and why it occurs as it does. Or, in other words, we need to know the how, where, and why of water. We have only fragmentary information at present.

It has been estimated for example, that approximately two thousand billion gallons of water pass over the State of Illinois daily in the atmosphere in the form of clouds or unseen vapor while only about 5 percent of this moisture (99 billion gallons) falls on the land surface in an average day (1). There are problems associated with the measurement of this moisture to determine its distribution in time and space. Such studies are of great value particularly as it may be possible to stimulate the precipitation of moisture from the atmosphere. This has already of course been tried through cloud seeding. Other techniques are possible. The total amount of water introduced into any area must be determined whether it be into a drainage basin or a subsurface aquifer network, or into a political unit such as a county.

Many new techniques can be developed. For example, radar scanning of clouds is now being done at two land-grant universities providing continuous estimates of water content of clouds. These data are correlated with photographs coming down to us from the Tyros satellite.

Another major element in any total water inventory is the amount of surface water inflow and outflow from an inventory region. Our present stream gaging network and methods of gaging must be improved and extended to study the distribution of surface water in more detail, to locate regions within drainage basins from which ground water discharge is derived and thus define those areas in which water is available for exploitation. Methods of hydrographic analysis must be improved to aid in the evapotranspiration studies, bank storage studies, and to determine the influence of land and water use practices on streamflow.

Aquifer networks and their relationship to recharge and surface water bodies are known in detail in only few areas in this country. It is not enough to define the hydrologic and geologic parameters of aquifers; in addition it is necessary to know how aquifers respond to development and to changes in land use practices. This response cannot be determined in areas with complex geohydrologic systems by presently available mathematic techniques even with the aid of high speed computers. Electrical analog models, capable of simulating all elements of the hydrologic cycle, may provide the answer. All but the simplest models are costly, however, and will require investigations aimed at reducing their costs.

Type areas should be selected within various hydrologic environments in which to develop and evaluate methods of studying the numerous relationships discussed above. By concentrating research funds and effort in carefully selected areas new methods and an increased body of knowledge should be obtained which will be applicable to regional studies.

Considerable work remains to be done to understand ground water recharge. In particular how the type, distribution, and character of soils and plant cover and the distribution, nature, and frequency of precipitation influence recharge rates as well as water temperature and quality. The effects of land cultivation and deforestation on permeability and recharge must also be investigated. Ultimately it should be possible to increase natural recharge through sound land-use practices, zoning restrictions, and artificial recharge by program pumping near lakes, rivers, and springs, by pumping to intercept rejected recharge, and by a host of other artificial recharge means.

New treatment facilities and techniques must be designed to combat the pollution and contamination of surface water and ground water by heat, sewage, organic waste, mine tailings, chemical wastes, irrigation runoff, radioactive wastes, and sediments.

In the past year at my institution we have spent a quarter of a million dollars on just the first phases on waste water renovation and conservation. Instead of running the detergent polluted sewage into a nearby stream we are experimenting with spraying it on our experimental forests and agronomy crops to use the detergents as fertilizer, to purify the water and to return part of it to the underground reservoir.

Such large-scale demonstration research projects are expensive but must be carried out. They require the coordination and close cooperation of geologists, engineers, bacteriologists, foresters, agronomists, soil technologists, and others.

Research is needed to improve on hydrologic predictions in climatological events. At present these predictions are based on statistical interpretations of a minute sample of climatic data which dates back about 100 years and streamflow data for about 50 years. Hendricks (1962) states that these data show considerable variability and are inadequate to define past or future distribution of hydrologic or climatic events. Through research it should be possible to extend our records backward in time through paleo-climatological studies involving the use of historic events, geochronologic and dendrochronologic and geologic evidences. These studies should provide an indication of climatic changes which are of direct concern to man.

These studies relating to the total water inventory must be supplemented by estimates of current and future demand for water.

A host of variables must be investigated to determine factors that influence present water-use patterns for domestic, industrial, irrigation, recreation, waste dilution, navigation, and wildlife management purposes. Only if these variables are understood will it be possible to predict trends in water use which are necessary in water resources planning. For example, more has to be known about the following: water use and withdrawal for public and private water; disposal methods and requirements; social, economic factors influencing water use; system conditions and pricing which influence trends in water use; efficiency of distribution and use of water; performance of engineering works; past and current trends in water use; quality requirements for various purposes; aerial distribution of wells and septic tanks. From an irrigation standpoint, the value of water for irrigation must be considered in competition with other demands.

In conclusion we propose that expanded water resource research, to include both applied and basic research, represents a wise use of public funds and, in fact, an indispensable one at this time in our history.

Universities and colleges recognize they have a responsibility in this research effort which they can execute with the assistance of the legislative and administrative branches of the Government.

Thank you.

Dr. MORGAN. Mr. Chairman, this statement just concluded deals with some of the things that need to be done in a comprehensive research effort, that in the end it takes people to do them and to solve the critical manpower needs and other features of this proposed legislation, that is to say what might result in the way of the production of trained manpower.

President Draughon, president of Auburn University, will speak on this.

STATEMENT OF DR. RALPH B. DRAUGHON, PRESIDENT, AUBURN UNIVERSITY

Dr. DRAUGHON. I am grateful for this opportunity to support H.R. 2683, for I am confident that this legislation will make possible the same type of productive research in the complex area of water resources that has characterized the Nation's successful agricultural research program. I am particularly pleased that it has fallen my lot to speak on the subject of national manpower requirements in this area, both because of the signal importance of this matter and because this legislation provides a very effective approach to the critical problem.

All of us who will speak here today for the association will emphasize not only the great need for a tremendous amount of research in all phases of water resources but the urgency of this matter for our Nation.

To do this research we need more trained manpower than is presently available. We need many more people with outstanding competence in some aspect of the broad field of water resources, and we need more than this. We need a large number of broadly trained people capable of planning and executing effective research programs in this area. I would agree with Dr. Abel Wolman (Chairman of the Water

Resources Study for the Committee on Natural Resources of the National Academy of Sciences and National Research Council) that this very real shortage of broadly trained people is by far the “* * * most critical shortage in the field of water resources.”

The Nation's manpower inventory data are not sufficiently refined to permit reliable estimates of the number of individuals engaged in various aspects of water research. However, all available information supports not only the observation that the supply of qualified individuals is not meeting the demand at the present but also the assertion that there is a critical shortage of persons with the training required to meet future needs.

An imposing list could be prepared of the agencies which need water resources specialists in their present and planned programs. To be accurate, such a list would have to include virtually every Federal, State, and local agency, for the program of all these are involved with or affected by water in some way. I am sure that most of us would be amazed at even the most conservative estimate of the number of water resources specialists needed to implement important realistic programs such as the one recommended recently by the U.S. Study Commission on Southeast River Basins.

Our present and future manpower needs in this Nation are sufficiently impressive to warrant immediate attention and action at both State and National levels. There is another aspect of this problem that merits repeated emphasis. This Nation has almost unlimited opportunities to provide leadership in the area of water resources in international assistance programs. To meet this challenge while supplying our own needs, we must find ways to provide graduate education and related research training for much larger numbers of qualified persons than those now being prepared for these jobs.

This brings us to a brief consideration of how this legislation can play a part in providing this manpower. On the surface it would appear that the proposed expansion of research provided for in this legislation would only serve to place greater demands on the available manpower and to aggravate this critical problem. It is possible that this can result in isolated instances in the early phases of the program. However, we are confident that this will not be serious and that in fact the net result will be to provide rapid relief for the manpower shortage.

Much of the basic research which is so urgently needed can be done effectively by people presently engaged in research or teaching in specialized aspects of the hydrologic sciences when support for this work can be provided through the water resources institutes or centers. As the institute or center provides this support and coordinates the research in all phases of water resources, more graduate students will be attracted immediately to study with these men. Such an arrangement will permit the student to develop a comprehensive understanding of the complex area of water resources while he is pursuing in depth some aspect thereof in an area of major specialization.

This general pattern of operation has been employed successfully in water resources centers and on a larger scale in other multidisciplinary activities, and it is being adopted by a number of those institutes or centers being developed—including the one established this year at Auburn University.

Mr. ASPINALL. Thank you very much.

Dr. Morgan?

Dr. MORGAN. Mr. Chairman, our testimony has been designed hopefully to set forth in these first two statements an indication of some of the things that need to be done and call attention to the concurrent need for training of manpower to fill the requirements for the future.

Now, we would like you to hear Dr. E. T. York, provost, University of Florida, who expects to comment on the adequacy of the funding provisions of this bill to help achieve some of these admittedly large goals. Dr. York.

Mr. HALEY. Mr. Chairman, may I be recognized?

Mr. ASPINALL. Not for a question at this time.

Mr. HALEY. No.

Mr. ASPINALL. This gentleman is from your area. Surely.

Mr. HALEY. Mr. Chairman and members of the committee, Dr. York has just joined us recently in the Sunshine State of Florida. While I have not had the privilege of knowing Dr. York previously, he comes to us well recommended and I want to not only welcome him to the State of Florida but to welcome him to this committee this morning. We are very happy to have you.

Mr. ASPINALL. You may proceed, Dr. York. Are you going to speak from your whole statement or just testify to parts of it?

STATEMENT OF E. T. YORK, JR., PROVOST FOR AGRICULTURE, UNIVERSITY OF FLORIDA

Dr. YORK. It is a rather brief statement and we will cover most of it in our statement.

Mr. Chairman, Congressman Haley, and gentlemen, I welcome this opportunity to appear before this committee in support of H.R. 2683 and companion bills. In doing so, I would like to commend the sponsors of this legislation, including our own very distinguished Congressman, Billy Matthews.

This could well be one of the most significant pieces of legislation under consideration by the 88th Congress.

I come from the "humid" Southeast—from a State having one of the highest rates of precipitation in the Nation. Our water problems are different, but in every respect as serious, as those of my colleagues from other regions of the country.

My State is experiencing the fastest rate of population growth of any State in the Nation. Associated with this is a very rapid growth of industry and agriculture. All of this is contributing to a great expansion in water requirements and a great need for research aimed at discovering more effective means of conserving, managing, and using this precious resource.

Others will discuss more specifically the need for this research. My mission is to consider briefly the nature and adequacy of the funding proposals in this legislation.

It is quite evident that the authors of this bill have made a careful study of means by which a sound program of research in the development and use of our water resources could be carried out. Furthermore, they have proposed a pattern of funding which should help assure the achievement of this goal.

When fully implemented (by 1968), this legislation would provide a total of some \$20 million for water resources research. Under section 100(a), one-fourth of this amount, or approximately \$5 million, would be divided equally among the 50 States. These funds would be allocated within each State to the land-grant and/or State universities—as designated by the Governor or State legislature.

The remaining three-fourths, or \$15 million, would be made available to the Secretary of Interior, who would be authorized to allocate these funds for the support of water research. Under section 100(b), \$5 million of the total would be made available on a matching basis to the institutions receiving grants under section 100(a). These funds would not be divided equally among the States (as under sec. 100(a)), but would be allocated by the Secretary of the Interior for the support of specific projects wherever this work could best be carried out.

Under title II, the remaining \$10 million would be allocated by the Secretary of Interior to educational institutions; private firms and foundations; agencies of local, State, or Federal Government; or any other appropriate organization, to undertake research dealing with any aspect of water problems which might be appropriate.

Obviously, a major portion of these funds could be used at the discretion of the Secretary of Interior to support any phase of water research considered to be important. This would permit maximum flexibility in allowing the Secretary to make use of expertise and facilities wherever they existed throughout the Nation, to adjust the focus of water research efforts to conform with changing patterns of problems, and to concentrate on broad problems of national concern.

We know these problems will change with time.

We think this feature of the bill is appropriate and desirable.

I would like to give major attention to section 100 of title I, which authorizes the creation of State water resources research institutes or centers. We think this could be one of the most significant provisions of the bill. This phase of the legislation would accomplish several desirable objectives:

(1) By facilitating the development of water resources research centers in each State, it would make possible, and indeed encourage, efforts aimed at solving acute local problems relating to water management. Every State in the Nation has water problems which are unique and different from those in other areas. These problems require attention and effort at the local level.

(2) It would provide the opportunity to make use of the experiences and competencies of outstanding researchers in many different universities. Each educational institution in the various States which might be involved in this program has certain areas of excellence, with personnel uniquely qualified to make outstanding contributions to a total national program in water research.

Furthermore, the creation of these research centers would provide the nuclei around which well-coordinated, interdisciplinary research would develop. These State universities have personnel and facilities in many different disciplines concerned with water research—including engineering, law, chemistry, physics, geology, economics, many phases of agriculture, medicine, and others. The complexity of many water problems today demands the involvement of many of these different disciplines in broad, well-integrated research programs. These universities provide the resources and vehicle for such a program.

(3) The development of water resources research centers in each State would do much to increase our supply of trained manpower in this entire field. Although the funds which would be made available under this legislation are not designated for training, per se, they would do much to stimulate student interest in this area of work. The presence of a water resource research center within a university, along with a growing body of knowledge relating to water resources, would, in many instances, encourage the development or expansion of course work and curriculums in this field. Furthermore, the research funds themselves would provide direct support for the training of graduate students involved in research on water problems. This stimulus to the development of trained manpower could be one of the most significant features of this entire bill.

We think this could be one of the most significant features of the bill.

(4) I am confident that title I of this bill would accomplish another very desirable goal. It would generate greater local support for the conduct of water research. The funds which would be made available to each State under this act are rather meager in terms of the total need for research in this field. These funds, however, could, and I am sure would, serve as a catalyst to generate greater local support for research in this area.

A prime example of this is found in the programs of agricultural research at the State land-grant institutions. These programs were initiated by the passage of the Hatch Act in 1887, which made certain amounts of Federal funds available to each State for the conduct of agricultural research. Throughout the years, there have been additional amounts of Federal funds appropriated for the support of these programs. However, today, for each \$1 the Federal Government appropriates for agricultural research in the State agricultural experiment stations, State governments are appropriating approximately \$3.50.

I believe we could expect a similar pattern of development in water research.

The fact that local people, through their State governments, have been willing to provide this type of increased support for these research programs, is perhaps one of the best indications of the value of and need for these efforts. I believe we could expect a similar pattern of development in water research.

(5) The creation of research centers in the State institutions as proposed in title I, would offer still another advantage. Many of these institutions have well developed programs of extension education, which can be effective in getting the results of these research efforts put to immediate and most effective use. The close partnership between agricultural research and extension education within land-grant institutions has contributed greatly to our remarkable progress in agriculture. There are opportunities for development of similar relationships in the field of water management, conservation, and use.

Let me refer briefly to one or two other desirable features of the bill from the standpoint of the method of funding.

It provides the opportunity for two or more States to join together in working on regional resource problems. This permissive flexibility seems very desirable, particularly for those States having common problems, such as those arising in certain river basins, coastal and estuary areas, and so forth.

Another commendable feature of this bill is the realistic approach to the use of funds. Obviously there will be a wide range of needs among the States for the most effective use of funds. Some have physical facilities which can be used with little or no alteration. These States can immediately allocate funds for salaries and operating expenses in a well conceived program of research. There will be other States where manpower is available, but facilities and equipment are lacking. This flexibility will permit each State to proceed on a sound and orderly basis, consistent with the needs of a long-range program.

Some concerns have appropriately been expressed in earlier hearings over the lack of accountability for the expenditure of funds made available to the States under section 100(a) of the act. Concern has also been expressed over the need for coordination of research efforts among the different water resources research centers throughout the country.

May I suggest that the 76-year history of use of Federal funds by State experiment stations under the Hatch Act provides a successful model which might well be considered as a basis for resolving the concerns relating to the legislation now under consideration. Indeed, the great achievements by American agriculture are in no small measure, a reflection of the tremendously successful Federal-State cooperative research program in agriculture. This current legislation provides an opportunity for an equally significant cooperative endeavor in the field of water management, conservation, and use.

We strongly endorse this legislation, including the very sound proposals for funding this program.

Thank you, Mr. Chairman.

Mr. ASPINALL. Thank you very much, Doctor.

Dr. Morgan?

Dr. MORGAN. Mr. Chairman, the chancellor of the Irvine Campus, University of California, Dr. Daniel G. Aldrich, Jr.

Dr. ALDRICH. Mr. Chairman, members of the committee, with your permission, sir, I should like to recommend for the record the complete statement which is being passed out to you.

Mr. ASPINALL. Without objection, it is so ordered. You may comment as you may see fit.

STATEMENT OF DR. DANIEL G. ALDRICH, JR., CHANCELLOR, IRVINE CAMPUS, UNIVERSITY OF CALIFORNIA

Dr. ALDRICH. Thank you.

My statement actually raises five questions and makes a comment and I would, for the remarks this morning, confine them to two questions.

I appear as a member of an institution that has long been involved in water resources research and as a chairman of the coordinating board of that research center. I have been asked to comment by Dr. Morgan about how a State that has been so involved would utilize resources made available to it under the proposals of this bill.

I. "What a State that is concerned about its water resources has done in planning and developing them."

Most of the States in the arid West have taken the initiative in the development of their water resources. The early pioneers were realists

and fully appreciated the vital importance of the development of water supplies. Within a day after the arrival of Brigham Young in the Salt Lake Valley in 1847 water was diverted from City Creek for the purpose of irrigation. California took steps to plan for development of its water resources 8 months before its admission to the Union.

In all the arid States, development of water resources was hamstrung by centuries of common law which had firmly established riparian rights, including the court approved right to waste water urgently needed elsewhere. In California as in other States, firm actions were taken to break with this crippling tradition. By 1880 the State engineer was engaged in an assessment of the water resources of the State of California and was pressing for careful coordinated planning for their development. In 1887, the Wright Irrigation Districts Act broke the monopoly of riparian rights and, as amended, provided the impetus to the growth of locally developed irrigation enterprises.

Nor was the phenomenal growth of irrigated agriculture the sole force in water resources development. By 1900 the city of Los Angeles had outgrown the water supply provided by the combined above ground and subsurface flow of the Los Angeles River. In 1905 the voters approved a daring engineering proposal to build a 250-mile aqueduct to bring relief to a water rationed community. San Francisco, facing similar problems, approved its Hetch-Hetchy aqueduct system to the Tuolumne River in Yosemite at about the same time. By 1930 the demand for water in southern California had outstripped even the most liberal estimates and, by means of a State enabling act, these communities were joined in a metropolitan water district, now serving cities from San Diego to Ventura.

Regional planning in California came to a head in 1930 with the first "California water plan." A bond sale to finance the first phase of this project was authorized. Because of the depression years the bonds failed to sell and the project was constructed by the Federal Government as the "Central Valley project."

Most recently, under an updated California water plan, the voters of the State authorized the Feather River project carrying water to the productive but arid southern San Joaquin Valley and to the south coastal districts.

Although the pace of economic development in California has resulted in greater development than has occurred with her neighbors, a similar story can be told for the other States of the arid West.

California's research in water resources, like that of her neighbors, was first directed to the identification of supplies and needs. As the more readily available sources were exhausted it was necessary to turn to alternative more costly projects and to take steps to determine more accurately the duty of water and to provide for more efficient use. The colleges of the University of California, particularly engineering and agriculture, devoted considerable time and attention to these problems. Because of the impact of the Hatch Act the latter moved with exceptional efficiency toward the solution of those problems related to the use of water for agricultural purposes including the effects of water quality.

By 1955 it was apparent that for the guidance of water resources development in California, this piecemeal approach to water resources

research in the university was both too little, too late, and somewhat less than well coordinated. With a budget of \$100,000 from State funds provided by the Collier bill a coordinated research program was initiated by the University of California in 1956. This evolved in 1956 into the water resources center. Responsibility for saline water conversion research conducted by the university's colleges of engineering since 1952 was assigned to the center in 1958.

The water resources center has been quite successful in stimulating appropriate research and suggesting the recasting of other studies. It has provided research funds with a minimum diversion of the attention of the research staff. It enjoys excellent cooperation with all departments of the university. The center conducts its research through these departments, providing a medium for interdisciplinary discussions. It complements rather than replaces the current research of the departments and has permitted undertaking important investigations which otherwise would not be feasible. In many cases the combined resources of the center have attracted extramural funds, increasing the total effectiveness.

The center has also served as a focal point for the dissemination of research results to and from other universities throughout the country and to the State department of water resources. It currently has a mailing list of 265 libraries, important individuals, and local, State, and Federal agencies.

II. "What effect would a Federal source of funds for research, such as those provided in the Anderson bill, have on such a State?"

There are some important ideas which have developed in the last few decades which have altered the nature of water resource research. Unappropriated water has become increasingly scarce, the quality poorer, and the cost of its development correspondingly more expensive. Water in the Turlock and Modesto Irrigation Districts of California has a cost less than a dollar per acre-foot. The Los Angeles aqueduct delivered its first water at a cost of \$6.10 per acre-foot. Current cost of Colorado River water to the metropolitan water district, including current taxes, is about \$40 per acre-foot. The Feather River project will deliver water at a cost variously estimated from \$60 to \$80 per acre-foot. These developments have occurred at approximately 30-year intervals and each has come barely in time to alleviate a serious water shortage.

These steadily rising costs and progressively more monumental projects put an even greater burden on research, both to reduce their cost to a minimum and to solve the geometrically increasing number of problems associated with more intensive development.

Furthermore, the nature of the research problems has changed materially. Emphasis in California is now on regional and interbasin aspects of water resources. Political and economic questions associated with long-distance transfers of water have been raised. A far greater number of alternative elements of the plans for regional development must be considered. These accentuate the cry for more and more accurate information in all aspects of water resources, physical, social, and economic.

No individual university today can be expected to finance all the research required by that State's water resources development. The research that it does conduct however will accrue to the benefit of other

States and to the Federal agencies. If adequate attention is to be given to the important research problems which face all of the United States with a greater or lesser urgency, more work must be encouraged and a considerable degree of national coordination provided.

Federal financial assistance as provided in the S. 2 bill should serve as the catalyst for stimulating the additional research which is vitally needed. The Water Resources Service should provide a focal point for nationwide coordination of all water resources research, supplementing the research program where necessary with contracts and grants.

One of the most important features of the financial support to the water resources institutes is the efficiency with which those funds can be directed to productive investigations. As a conservative estimate at least 20 percent of the research time of the university staff is used to prepare contract and grant proposals to a variety of sources of funds and to prepare interim progress reports to each source. The water resources institutes, if the experience of the water resources center can be taken as a guide, will substantially reduce this encroachment on productive research without loss of financial control or necessary administrative supervision. Additionally, the long unproductive time lag, which now often exists between the formulation of good research proposals and their ultimate funding, can be virtually eliminated. The most critical element in water resources research other than funds is qualified principal investigators. Their time must be used most effectively. Because the water resources institutes will be quite familiar with the capabilities of the research staff a minimum diversion from productive research will be required in order to assess fully the contributions to be expected, and their importance to the overall problems of water resources development. The result will be more effective utilization of research staff for research.

III. "What effect would such funds have on a State which has not begun planning and development of its resources?"

Water problems have the habit of proving the truth of the adage, "You never miss the water till the well runs dry."

Those States which have only begun water resources planning are often aware for the first time of the urgency of their problems. The need for research, historically, has not been apparent until the time when all the attention of the community must be directed to the solution of a critical problem.

Despite the success of the Water Resources Center of the University of California, it is painfully evident that such a research unit should have been organized at least two decades ago. In order to meet demands for water in 1970 concrete must be poured today. Firm decisions have been required even though it was evident that 5 years additional research could have made a material difference on costs, pricing, and financial feasibility.

States whose water resources planning has just begun may profit from this experience. The Anderson bill will provide the incentive for those States to move promptly on the research questions which must be resolved by the time the moment of final decision arrives. It also provides for improved coordination by which these States may make use of the research contributions already made which have applicability to their problems. Equally important to the United States

is the welcome increment to water resources research provided by the staff of universities in these States toward the resolution of problems in other sections of the Nation.

IV. "Describe how the Hatch Act has benefited agriculture in each State without placing limitations because of Federal origins of funds."

Experience with the Hatch Act, which provides similar Federal support for agricultural research, demonstrates the effectiveness of the form of support proposed in the S. 2 bill.

In most other instances, where there is a multiple source of funds for a research project, there has resulted considerable inefficiency. The request for funds itself has to be directed to many potential sources in order to obtain support from a few. Each request must be phrased differently in light of the specific objectives of the potential source. More often than not the response is several grants or contracts each small in amount. Often each contract will require a specific localized objective. This procedure results in a very substantial portion of the principal investigator's time spent in the quest for funds for his research and in diversionary studies of less general importance. Such is the normal situation for much of the research in departments of engineering across the Nation.

In contrast to this, agricultural research departments, because of the Hatch Act, have been able to devote most of their research talent to the problems of research rather than in seeking support. Minor objectives of special groups can still be accomplished through grants and contracts but the Hatch Act has given these departments the ability to pursue an integrated program of research, well coordinated nationally, without limit or restriction because of source of funds other than that of basic policy and the mutually complementary objectives of State and Federal Government.

The combined financial resources of State and Federal Government have permitted a broader scope of research activity. Long-range projects, ordinarily infeasible with local or special interest financial support, have been undertaken. Modern equipment has assured first-class research information in place of a crude experiment and an extrapolation.

The research staff members, under the Hatch Act, are quite unaffected by the particular combination of State and Federal support accorded their research. Other than being fully aware and appreciative of the sources of funds and the effectiveness of this combination, they are free to pursue his research in the objective manner which is a prerequisite for accurate and useful results.

Nor does it appear from the experience of the Water Resources Center of the University of California that any problem will arise with both Anderson bill funds and Hatch Act funds provided to the same center or institute. Support by the center for water resources research in the agricultural departments of the university complements the support provided from State and Hatch Act funds. It has not diminished previous support from these sources nor has it detracted from other important programs in agricultural research.

There has resulted greatly increased coordination between the research of the agricultural departments and other departments of the various campuses of the university. There has also resulted a greater

appreciation of the complex interrelationships which exist and a corresponding trend toward water resources research and agricultural research in this broader context.

V. "Comment on the need for this program to be administered at Secretary or Under Secretary level."

To be fully effective, this program should be administered at the Under Secretary level. It is imperative that the research program should be broad. It is even more imperative that it be dynamic. This virtually precludes a routine assignment of its administration as a collateral responsibility of any one bureau or office.

The modern multiple-use concept is vital to optimum development of water resources. At the same time, multiple use also implies multiple conflict of interest between many of these users to a greater or lesser extent.

Under these circumstances, it is obvious that no one of these multiple users should be given a research advantage over any other if long-range water planning is to serve equitably all the parties involved. For this reason alone administration at the Under Secretary level would appear to be a necessary condition for the ultimate success of this plan.

High-level attention is important from another point of view. The water resources research program must be dynamic and responsive to the needs of the Nation. It must reflect matters in many other areas of the national interest including virtually every other secretarial department and executive office. National defense, health, education, international relations, commerce, and agriculture, to mention a few, have inseparable interests in the water resources research program. To fractionate the research effort among these departments would destroy the very purpose of the act. To bury it deep in any one department would be equally destructive.

VI. "Comment on the need for total program development in water resources to be a cooperative one between States and the Water Research Service."

Just as the need for cooperation and coordination at high levels of the Federal Government is essential to the success of the administration of this program, so the need for a truly cooperative relationship between the Water Research Service and the States is vital to the execution of the program. This must be based on a mutual understanding of the strengths and modus operandi of each.

State and privately supported universities provide a unique assembly of research staff of highest competence for both fundamental and applied research. Long experience has demonstrated that this assembly makes its greatest contributions when it is governed only at the policy and objective level. More detailed instructions for the guidance of the work, allocation of funds to the specific studies and similar controls should be the responsibility of the director of the water resources institute and its governing body. These persons are in the best position to assess both the need for research in a given area, the capabilities and limitations of its research staff and facilities in that area, and the extent to which more detailed guidance will be necessary.

Responsibility for nationwide coordination must rest jointly on the water resources institute and the Federal Government. Where neces-

sary research is required in an area not adequately covered by the water resources institute, the Water Research Service must be in a position to fill the gap through direct grants or contracts with any qualified research group willing to undertake the study. At the same time, care must be taken that indiscriminate contracting for the services of the same research staff required for the water resources institute's programs does not work to the disadvantage of the national interests.

Nor is the policy and objective guidance a one-way street. The research staff and the administrative officers of the water resources institutes, through direct contact with those intimately concerned with specific problems and through their own independent status, are often in an excellent position to evaluate research needs and their priorities in an objective manner with first-hand information. The water resources institutes must be given an adequate voice in the development of a long-range water resources research program. This voice must be that of a cooperative partner if, through research, both State and National interests in the optimum development and preservation of our water resources are to become a reality.

Thank you for the opportunity to comment.

Mr. ASPINALL. Doctor, I wish that you would return to your page 7 and give us a brief statement of the contents of that particular part of the statement.

Dr. ALDRICH. Page 7 which suggests how the Hatch Act has benefited agriculture in each State without placing limitations because of the Federal origin of funds.

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financial support, have been undertaken. Modern equipment has assured first-class research information in place of a crude experiment and an extrapolation.

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There has resulted greatly increased coordination between the research of the agricultural departments and other departments of the various campuses of the university. There has also resulted a greater appreciation of the complex interrelationships which exist and a corresponding trend toward water resources research and agricultural research in this broader context.

Mr. ASPINALL. Thank you very much.

Dr. Morgan?

Dr. MORGAN. Mr. Chairman, we have been underway approximately 50 minutes and in another 10 minutes or less I should like to conclude our formal presentation with a summary of a statement that I should like to file with you.

Mr. ASPINALL. Without objection, the statement will be made a part of the record.

The doctor may be permitted to testify.

STATEMENT OF DR. W. E. MORGAN, PRESIDENT, COLORADO STATE UNIVERSITY, AND CHAIRMAN, WATER RESOURCES COMMITTEE, ASSOCIATION OF STATE UNIVERSITIES AND LAND-GRANT COLLEGES

Dr. MORGAN.

WATER AS A PUBLIC RESOURCE

1. Why invest in research on a broad and diversified basis? Gentlemen, you have heard why we think this bill will open the door to eventual solution of many of the Nation's problems presently associated with water use and development. I shall not attempt to summarize these points. Rather, I would like to bring to your attention reasons which call for public support and investment in research on a broad and diversified basis. We are all aware of the manifold financial decisions facing the Congress as well as other levels of government. Yet, the expenditures contemplated under this bill must be classed with those which are directly an investment in the future productivity of our economy.

To what extent will such investment be made by the private sector, and to what extent is technological progress and the solving of serious problems of water allocation a public responsibility? A few activities will be carried on by private enterprise as has been noted previously, and State and local governments will attack some specialized problems. But the basic and fundamental solution calls for research effort that extends beyond the normal range of immediate interest or beyond the funding capabilities of these units.

The contribution urgently needed at the present time is a contribution of knowledge. When this is available, other agencies will have many tasks to perform. By providing this system for financing research, public support is not supplanting the efforts of others; rather, it enables others to expand their efforts and lessens the risk of failure as they undertake their own research. This way of doing things is the essence of our heritage of economic and political organization. The productivity increases which have ensued from the agricultural experiment station system indicate the creative potential from this type of partnership organization and effort between central and local governments.

Water is a public resource. A phrase to the effect that the water in a State is the property of the people, or that water is owned by the people or the public, is not uncommon in State constitutions. Public rules have been defined which permit private rights to water use, but the very nature of the resource has resulted in a continued public interest.

2. Water quality: Let us look for a moment at one of the most vexing current problems which is destined to become more troublesome in the future; namely, the quality of our available water. These questions are important in all of our major river systems. In an earlier time, individual users, whether farm, industry, or municipality, gave scant attention to these problems. However, today's increased pressure on water use has greatly changed this situation. Urban wastes contaminate other urban uses. Irrigation return flow inhibits future agricultural use. The degradation of ground water imposes a limitation upon other users today as well as in the future. In many of these situations, intergovernmental relationships are very significant, including municipality, State, and international.

Two of the crucial questions at this point are technological and economic with the legal and organizational problems being closely associated. Since an individual user seldom suffers the effects of his own pollution but shifts them to the downstream users, public responsibility has been widely recognized by the establishment of minimum standards for effluent. The tendency has been to shift the incidence of the cost, at least in part, back upon the original user.

At this point we are brought face to face with the technical-economic issue. Does the user have available technical means to improve the quality of his effluent and not be forced to price himself out of the market? The public can make the rules and organize the enforcement of the criteria. We need research to provide the technology and to improve the rulemaking structure itself. The responsibility to see that the basic scientific information is available which farmer, industry, municipality, and Federal agency can adapt to their particular situations and interests is widespread and continuing in nature. The

results that flow from research made possible by H.R. 2683 can be a major factor in organizing the orderly and economic disposal of wastes not only by stimulating research but by making readily available within each State a center from which scientific information can flow to farmers, industries, municipalities, and others who have need of it. All State universities are experienced not only in research but in the communication of scientific information to those who need it through extension education program both formal and informal, through seminars, workshops, publications, and so on.

3. Recreation: Quality limitations have been important to many fields of water use, both old and new. A use which is not new but which has been expanding rapidly is recreation. This is important from the high mountain trout streams, down to reservoirs and lakes, along the rivers to the ocean estuaries and seaside beaches. Need I do more than assert the common observation that water attracts people from the crowded metropolitan park to the wilderness area?

Quality is also important in this case—quality of recreational enjoyment. Our ability to judge and assess these characteristics is extremely crude to say the least. Some recreational activities enter into the commercial market, yet major factors with respect to water based recreation are not market oriented. The investment which provides them is often a public investment, and public rules and regulations control the activities on the water. The issues seem clear that the problems ensuing from the increased pressure of recreational use are public issues.

Let me just suggest some of the questions which are relevant. To what extent and in what fashion can part of the costs of public recreational investment be repaid by the users and still provide recreational opportunities on a wide enough basis to satisfy our criteria of democratic equity? This is not a simple problem and will need more concentrated research effort than is presently being devoted to it. What are the best criteria for deciding upon sites for recreational investment? To what extent are various recreational water uses competitive with each other and with other uses? If the uses are mutually exclusive, by what criteria can we allocate the water; or, if they are complementary, how can we organize uses to yield an optimum benefit? These are just a few questions of a policy nature which urgently need answers based upon sound research.

And again, they are problems which confront State and local governments as well as the Federal Government. Indeed, the Outdoor Recreation Resources Review Commission describes the States and State and local areas as key in meeting recreational demands. Every State and many communities will be confronted with problems of best allocation and management of complementary uses of specific waters to serve recreational needs.

4. Recreation uses illustrate again the need for multidiscipline research: You may wonder that I have not mentioned any of the technological problems within this area—problems associated with wildlife and watershed management in particular. My not delineating these does not mean that I do not recognize their importance—just the contrary. They are also fundamental, but to handle the issues noted above we would need prior or concurrent knowledge in natural science fields. It is this relationship between the social

and natural sciences which I want to emphasize. The two fields are highly interdependent, and research needs in both fields are equally overlapping and intermingled. The organizational structure contemplated in this bill is designed to advance research efforts which will coordinate social and natural sciences as they attack our water problems. I call your attention specifically to the provision which establishes the research centers as an all university organization.

5. Navigation: No consideration of the public aspects of water can overlook one of the oldest public concerns, navigation on our major waterways. That we have such a long history in dealing with this facet does not mean all of the problems have been solved, as you are well aware. Important technical considerations concerning the maintenance and development of these channels is needed. And this function should be thoroughly integrated into the overall program of research into stream and channel management. Another essential ingredient is to relate through research this water use to other modes of transportation. Public accountability would demand no less. In this way we can expect these waterways to make their optimal contribution.

6. Flood control: Research into channel problems is not limited to navigation but relates to another of the long-recognized public responsibilities; namely, flood control. Specialized research has been going forward, but channel conditions are dynamic and present new problems as system development progresses. And as noted in previous instances, research in the area of the physical sciences should be coordinated with research into flood plain planning and development. We have examples of programs which are progressing, but the problems we face are larger and more diverse. Through a research program such as contemplated in this bill, the potential economies to be realized in flood control action programs of local, State, and Federal agencies are incalculable.

7. River system planning: Much of what has been said suggests the important idea that river system planning has been another major public responsibility. The basic research contemplated here will provide a firmer foundation for this planning—will provide better knowledge and techniques for this purpose. For example, many years ago the Congress provided for public planning for the use of hydroelectric sites. We still have the public responsibility to use the resources to make the best contribution to our economy.

As to the navigation, we have a public trust to develop the technology along with the integration of hydropower development with that from other fuel sources. Our power system a half century from now either will benefit or suffer from what we do today. The research initiated today will alleviate today's problems, but another of its lasting dividends will be the contribution it makes to building our economy of tomorrow.

8. Economic growth: The importance of municipal and industrial development to our future economic growth hardly needs stating. This growth obviously is dependent upon a multitude of factors other than water supply.

Reasonably priced water in adequate quantity and quality will not insure the economic growth of a region, but without it many of today's thriving communities would have been bypassed. Others

face a precarious future solely on the basis of their situation with respect to water supply. No one can guarantee that this bill will furnish the answer to their salvation, but no proposal offers more hope for proper guidance in the effort these communities will put forth to survive.

At the risk of being repetitious, I again point out that community water problems will vary with each community and H.R. 2683 admirably meets the need for a wide geographic spread of water science centers to serve such localized requirements for information and guidance.

9. Legal, administrative, and organizational aspects of water management: There are also legal and political uncertainties which are of major importance. Water law is at the same time both rigid and changing. These characteristics certainly are not without their value, but their force should act as a spur to let our best research knowledge help guide the direction of change.

Similarly, one of the most baffling tasks we face is that of organizing water management and development. Our political economy of water is complex; water is a production requisite universally employed by direct utilization; indirectly it touches every facet of our economy in exceedingly complicated financial and power relationships. The service to be rendered by public research into public organization should hardly have to be argued.

10. Theoretical and practical; basic and applied: Universal rules are hard to come by. Adaptation to solution of the problems of the moment is equally important. This bill will permit—will bring about—both a firmer understanding of the universal rules as well as application to particular situations. It provides the means, the organization and the incentive to tap the creative talents of the whole range of diversified brainpower available on university campuses and in the laboratories of America. It will stimulate both practical and basic research. It will provide the nucleus for training the experts—the hydroscientists—who are already greatly needed and who will be needed in increasing numbers as water problems become increasingly critical to increasing numbers of towns, States, and regions as well as to the Nation itself.

Before all of us now in this room will have passed on, this bill, if enacted, will have taken its place along with the Morrill Act, the Hatch Act, and the Smith-Lever Act as another monumental contribution to the structure of basic legislation that promotes the common good in America.

Mr. Chairman, we thank you very much for the opportunity to present our views, the views of the association, State university and land-grant colleges on this important legislation.

Mr. ASPINALL. Dr. Morgan, for the members of the subcommittee, and the acting chairman, I wish to thank you for the fine presentation that you and your associates have made this morning, a coordinated and effective presentation.

May I say that although two members of this subcommittee have sponsored this legislation, so far as I know there is no particular pride of parentage that is involved.

This committee does not sponsor bills and then try to have hearings in order to see to it that the bill receives favorable consideration. The

subcommittee and full committee take bills that are sponsored and introduced and try to substantiate from testimony given, support for a program which ultimately we may find to be necessary; so if questions are asked of you gentlemen this morning and perhaps this afternoon, please keep in mind that these are questions which members of this committee feel are necessary to have answered in order to support any legislation that we may take to the floor of the House.

We are primarily interested in the protection of this one of our two greatest natural resources. We want to see to it that this natural resource is used wisely and effectively. On the other hand, we also have a feeling about the taxpayers' pocketbooks and we do not want any program authorized that would spend needlessly taxpayers' money. I think it is interesting to note as we begin questioning you gentlemen that only about eight-tenths of 1 percent of all the research moneys that Uncle Sam provides are spent for research in the programs under this committee's jurisdiction, and perhaps only five- or six-tenths of 1 percent is spent for water research programs as such in Federal programs, and only about four-tenths of 1 percent is spent by Interior.

Therefore, what we are talking about at the present time is a rather minor operation as far as the Department of Interior, over whose activities this committee has some responsibility, is involved.

I will ask my colleague from Florida, Mr. Haley, to start the questioning.

MR. HALEY. Thank you, Mr. Chairman.

Dr. Morgan, I, too, want to commend you and your colleagues for making a very fine presentation here in what I consider a very vital field.

As I stated some time ago at a previous hearing down in Florida, we do not have too much of a problem of not too little water. We have sometimes too much water but, nevertheless, we have a saying down there that "You never miss the water until the well runs dry", and we have now I think and will in future years have a great responsibility here to properly utilize the water resources of this Nation because it is rapidly, in my opinion, reaching that point.

I have observed over a long number of years the study of water resources in my own State. Of course, as I say, at the moment we do not have a shortage of water. Sometimes we have too much water.

Dr. Morgan, you are well aware, as the chairman has so ably put it, you are well aware of the fact that some of us at least in this Congress are a little disturbed about the expenses of various operations. While this operation would only be approximately \$20 million, total gross, you are well aware of the fact that the Federal Government now is spending approximately \$15 billion in research annually. Do you know that Doctor?

Dr. MORGAN. Yes, sir, I understand that approximate figure.

Mr. HALEY. Are you aware of the fact that we now have research programs insofar as water is concerned administered by eight departments of the Government?

Dr. MORGAN. Yes, sir.

Mr. HALEY. And that their requested budget this year, 1964, was \$76,419,000?

Dr. MORGAN. I am aware of this approximate amount; yes, sir.

Mr. HALEY. Previous witnesses have given testimony that in this particular field there are not too many people qualified to do this kind of research. Is that substantially correct?

Dr. MORGAN. It depends on how they are classified, Congressman Haley. I can put my hands very quickly on some inventory information that indicates how many scientists of certain categories are available and approximately where they are located—if this is a pertinent to your question. There is no doubt but that the qualified manpower in the “water sciences”, if I may coin a term, are very limited.

Mr. HALEY. Would this program help that situation? If we had a Federal program, would it bring about the training of additional people to go into this field?

Dr. MORGAN. Very definitely it would, sir; but the initial effect would be to increase further the pressure on these limited numbers in manpower, but its ultimate and rather early effect would be to increase the flow of adequately trained manpower into these water sciences. This is the result of the graduate training program that would be instituted on each of the campuses where water research centers were located.

Mr. ASPINALL. Would it place the emphasis on finding scientists or administrators, Doctor?

Dr. MORGAN. It would place the emphasis on finding scientists.

Dr. ALDRICH. May I comment, sir, on this point? I think we should appreciate there is tremendous competition for good minds, wherever they exist, and as we think about the allocation of brainpower to do research on matters pertaining to water, we are entering into competition for the resources that will enable that brainpower to concentrate on water, or space, or atomic energy, or what have you. Because when we talk about water, or agriculture, or space, we are thinking in terms of the application of basic sciences to these areas. And so I think that it should be fully realized that as money is made available to pursue research on water, that there will be adjustment within the brainpower available to pursue it, but as concentration of brainpower takes place—we will say on water—in the community of scholars, research workers, and the students that come to the university, attention will be focused now upon the fact that a good mind is devoting his talent and his energy to the research on water; and this will attract good minds among the students. This is how the process of attracting and building a new supply of capable manpower is set in motion.

Mr. ASPINALL. Dr. Aldrich, water is no more important today than it was 10 years ago, and it will be no more important 100 years from now than it is today. This is a very fine general statement you are making, but are you doing this at the present time? Are you and your guidance counselors sitting down with these fine minds that come before your institutions, presently, and telling them the value of water and that, even though the amount of money perhaps isn't as attractive as in other fields, even though there will be less money for them in the future, nevertheless, this technical resource program is

very important? Now, what are you doing at the present time to get to this?

Dr. ALDRICH. I will answer the two questions which you have raised.

(1) What are we doing about it, and

(2) The circumstances that existed, say, a decade ago about the importance of water as a resource.

I will simply draw attention, Mr. Aspinall, to the fact that—also in California, Congressman Haley, we have that saying that you used. The opening statement on page 3 of my statement says:

Water problems have the problem of proving the truth of the adage, "You never miss the water till the well runs dry."

The focus today upon water problems is in large measure due to the fact that people have too long taken a natural resource for granted, and as a consequence of the intensified usage of the greater demands for water, be it for people or agriculture, of the associated problems of pollution, we are now recognizing that what was taken for granted is now an all too short resource, and therefore we've got to direct attention on how one may conserve it, how to use it more efficiently and the possibilities of even developing new water sources heretofore untapped—as, for example, the conversion of saline water to potable or more usable purposes.

As a consequence of this recognition of need I will go to my own experience. We established in 1956, the water resources center at the University of California to focus the attention of the minds then available in the university on its several campuses to the many problems related to water. And there is no question but what this caused some men who were exploring their particular discipline, be it chemistry, physics, economics, or law—to relate their explorations, now, because of money becoming available for research in this area, to water.

So we begin to see a shift in concentration, of focus of this available manpower on water problems.

As we see this taking place, we then see for the first time in the law schools, in the schools of engineering, in the schools of agriculture, young people being attracted to, and their attention directed to their opportunity, to take a place in society and make a contribution—again with reference to water. As we struggle in the colleges of agriculture around this country to compete for the good minds that are coming to the campuses, be assured—I know President Morgan's college of agriculture must be doing it, his college of engineering must be doing it. So in California we are out with the high school counselors, meeting with the science clubs, the vocational clubs, whatever device they have for informing students about career opportunities, of the fact that good minds are needed to carry on work in the area of water. So there is an aggressive program of acquainting young people with their opportunity in this field.

Dr. MORGAN. Mr. Chairman, I would like to recite another true-life example, in answer to the chairman's question of what you have attempted to do already to stimulate interest in bright young minds to elect this as a scientific career. I speak of our experience at Colorado State University. Five years ago we asked the Pack Foundation to make a grant to our institution for the purpose of en-

abling us to set up an interdisciplinary graduate program that we elected to call watershed management. We received the grant with a stipulation that it would last for just 3 years. We took it on that basis; we persuaded our State legislatures to continue the operation and so now we have on our campus a watershed management program funded largely with State resources.

What did we attempt to do here, and why? We attempted to bring together these specialists—and there are others. The engineer, the forester, the physiologist, the argononist, the economist, the biologist, and the wildlife management expert, into a unified team to offer a graduate program called watershed management. We awarded our first Ph. D. degree in this field just last year. Our problem has been one of attracting graduate students to this area. The program is growing very gradually. It happens to be incidentally one of the programs on our campus that would receive a very great boost from the funds that are contemplated under this legislation. That is to say, there would be a direct and immediate response in the output of highly trained people in the field here under consideration if the legislation now before you becomes law.

Then I would like to ask Dr. Osborn to comment on this.

DR. OSBORN. This is a very important point, I think, with regard to what the universities are doing now in order to attract these minds into water research programs.

I would like to emphasize the point that at universities normally all research is done with graduate students. The graduate program is part of the research program. We normally do not hire professional research people to do a research job. This becomes part of the thesis research by the graduate students and hence any research we do virtually contributes to training people in this field.

If I may use as an example figures I have before me with respect to Pennsylvania State University, we are spending this year on water research and water related research, \$470,851, and on this program there are 35 graduate students who are being trained in water research. So at the present time there is this output this year of 35 students being trained in these fields. I don't know how typical this is of other universities, but certainly this contribution if multiplied by a number of States represents a real increment in the number of people in this field.

MR. HALEY. Let me ask this question: Here is something that is disturbing the members of the committee. There seemed to be no coordination, either on the State or National level. For instance, in the eight agencies that are now in this particular field of Government—that is, Agriculture, Commerce, Defense, HEW, Interior, AEC, NSF, and TVA—there seemed to be no way to coordinate and no one seemed to know what the other is doing. According to the way I evaluate the testimony, these various agencies seem to be hiding out their research, so to speak, in the bushes, and it disturbs me, because we don't know, for instance, where in Florida we are doing one thing, California possibly doing something else, and someplace else doing the same thing.

We can be very sympathetic in Florida to you people out there in that arid, smoggy, earthquake-shaken, God-forsaken country. We would like to kind of know what people are doing.

Now, Dr. Morgan, could you give us a little idea of how this program could be coordinated? Remember now, that every one of these agencies that are now receiving substantial amounts of money for research are going to be in the position of saying, "Take it away from somebody else, but don't take it away from me."

Have you any suggestion how, nationwide, this program of research which I think is a very important one, how it can be coordinated, where there could be some way for the University of California, the University of Florida, and the University of Georgia, where they could go somewhere and find out what has been done heretofore? That is what disturbs me. There is no central place to obtain the tremendous amount of knowledge that must already have been assembled and there is no place you can go to to find out what has been done.

Dr. MORGAN. I would be glad to comment on this. I hope as an aside that you will permit the Representative from California to have equal time. I would like to be left out of this argument.

Mr. HALEY. The gentleman from Oklahoma, here, will probably ask for some time, too.

Mr. EDMONDSON. We are very happy about the whole affair.

Dr. MORGAN. Congressman Haley, the problem of coordination, in order to avoid needless duplication of effort, at the State level is one on which I should like to comment first, because this problem is somewhat different from that in the Federal establishment. Now, at the State level certainly I could not stand before you and say that in the 50 land-grant institutions with their very broad programs of research in the agricultural sciences and the health sciences and so on, that there isn't any duplication of effort. I would, however, like to say that the efforts of these institutions to avoid this are much more intensive than many people realize and are in general quite effective.

Now, on a case-by-case basis, which is how one would have to treat it in order to get at the facts, we have, as an actual example, a very effective means of regional committees in our agricultural research, with their representation drawn from States where these research problems cross State boundaries. And an actual allocation of the effort among the institutions represented in these different States so to avoid this.

Now, one of the things that has made this possible has been a provision of our Hatch Act funds to apply them to regional research projects and that feature is incorporated—it took a long time to get down to this point before, but that feature is incorporated in the proposed legislation, here. And the reference in the bill to collaboration between two or more research centers clearly expresses the Congress intent that this sort of thing be done.

Now, to be sure it has to be put into action by people who administer these programs in the various States and here is where I think the Secretary of the Interior, the appropriate head of a Federal department can, by judicious review of the research programs proposed to him from the various States, insure that there is a minimum amount of this kind of duplication to which you essentially refer.

I would like to say something reassuring to this committee that these colleges are becoming much better experienced in this sort of thing, and they are acutely aware of the necessity for avoiding

these examples of needless duplication. But out there where the work is being done, at the other end of the pipeline from Washington you are really close to the people and they see these things and they are quick to criticize them if they are not justified. We feel them very quickly. We are very acutely aware of this problem. By "we," I mean the representatives from all of these land-grant institutions. I feel sure that there will be unremitting attention given to this problem and unremitting concern about it.

Now, as for the Federal effort, actually I think our institutions may be a bit presumptuous in trying to suggest how the Federal establishment would coordinate its effort as between its departments. In many respects while it is of concern to us, it is not our business. We are aware that the problem exists. We feel that the bill provides through its provisions for the Secretary maintaining a catalog of water resources research information in which, if he follows the directive set forth here, he must compile this for all the Federal agencies. The bill contemplates he will ask the States to contribute to it. I feel sure they would cooperate with him. So this is the first step in achieving coordination and eliminating duplication in a program that is as varied and as widespread and parceled out to as many administrative organizations as this one.

This first step of inventorying what is being done is an absolutely essential thing and this is proposed in section 300 of the bill. We think it is a very essential feature of the bill.

Mr. JOHNSON. Will the gentleman yield?

Mr. HALEY. I yield to the gentleman from California.

Mr. JOHNSON. Having just a word in support of our State's effort out there, I think through our Senator we have made available to many, many other areas of the United States, both from the standpoint of universities, State departments, and private concerns, all of the results of most of our studies. I think at the present time our State is carrying on the largest program in this field. The reason we are doing that is to make sure that we are going to have water for those millions to come and I might say there are a few of those coming from Florida to California. We have approximately 18 million now, and the concern of the State out there is to make sure we all have a drink of water in the year 2000, so we have to get down to business. That is why our State is so much in support of this bill that is before the Congress. I do hope we will be able to work out a bill and get a program going in all of our colleges across the Nation. It will help us solve this problem.

Mr. HALEY. I thought I got off a little lighter than I expected.

Dr. YORK. We are very much concerned about the problem of coordination. As I indicated in my statement, I felt that the history of the administration of the Hatch Act provided perhaps as good a model of how a program of this nature could be coordinated as anything we might come up with.

I would like to explain briefly how this works: We have in the Department of Agriculture a small agency called the Cooperative State Experimental Station Service which is responsible for the administration of the Hatch Act and the funds thereunder. When any State proposes to initiate a project to be supported by Hatch Act or State matching funds, this proposed project has to be sub-

mitted to the Federal office, here. It is reviewed. The Federal office has a very complete inventory of research being conducted by all the other State experimental stations in this area, along with a complete inventory of the research conducted by the Agricultural Research Service, which is a USDA agency, and if there are areas of conflict, duplication of projects or overlapping, before 1 cent of these Federal funds can be spent, this problem has to be resolved. This project may be sent back to the State to ask that it be reconsidered. But there is this mechanism whereby each proposed piece of research that is contemplated to be supported by Hatch funds be reviewed to ascertain whether there are areas of overlapping or duplication. Now, this does necessitate a complete inventory of research programs in the Federal office, tied in with programs that are conducted by other agencies of the Federal Government. The States on the other hand are supplied with this catalog so to speak, so they, too, have a knowledge of this before they initiate work in this field.

I will say again, sir, this has been a tremendously successful effort, and I think might well provide a good model for operations in this area.

Mr. ASPINALL. The provision to which you gentlemen have referred this morning is not a part of this bill, is it? We have nothing in this legislation before us which has to do with any reference to the Hatch Act provisions.

Dr. YORK. That's right, Mr. Chairman.

Mr. ASPINALL. Did you gentlemen have anything to do with preparing the bill for introduction in the other body or this body? The other body sent it over here without what you consider to be a rather important addition to the legislation, is that correct?

Dr. YORK. In my judgment something approximating this would serve a very effective purpose.

Mr. ASPINALL. We are very appreciative of the suggestion you have made. That's the reason I asked you to read that particular provision of your statement.

Mr. HALEY. Mr. Chairman, I reserve the balance of my time. I understand the subcommittee will meet this afternoon and its within a minute or two of adjournment.

Mr. ASPINALL. We will proceed to 12 o'clock. There is no business on the floor today. I recognize the gentleman from Washington.

Mr. WESTLAND. I have listened very closely to the testimony of the distinguished gentlemen. Being from the State of Washington, I am very much interested in water, the development of water resources. I think I had been in Congress only 6 months when I realized that the greatest asset the State of Washington had was its fresh water. I have been in Congress 11 years. I felt that over the years this would prove to be true, and I think it has already been demonstrated.

I might add that the Congress—at least the House of Representatives and the Senate, I believe, but the House of Representatives at least has become so concerned over the research and development programs of the Federal Government—as the gentleman from Florida earlier mentioned, approximately \$14 billion or \$15 billion a year—that a select committee has been set up to study our research programs and find out just where and how this money is being spent and whether or not it is being spent to the best advantage of the country as a whole.

Now, \$66 million of the total program in water research is a very small proportion, of course, of a \$14 billion program. However, I am very much interested in what other States and other universities are doing. This particular piece of legislation, if nothing else, has stimulated me enough to find out what is going on at the universities in the State of Washington.

Now, Dr. Osborn from Pennsylvania State said that Penn State was spending \$478,000 and had 35 graduate students. I find that they got \$347,000 this last year from the National Science Foundation, which is a pretty substantial proportion of their total financial effort.

I would like to call the attention of you gentlemen to the fact that Washington State University—and I don't know how its undergraduate body would compare with Penn State in numbers, but I am sure it would be considerably less—is spending over \$1 million a year in water research and that only \$87,000 of that came from the Federal Government; that they have set up a water research center and the State of Washington has seen fit to sponsor this program in that very substantial percentage.

Now, that is just Washington State University, a comparatively small school.

I find that the University of Washington which may be more in the same category as Penn State in numbers at least, that there are 64 professors at the University of Washington dedicated to water research in its many aspects. There are 16 different departments studying this problem. That there are 65 graduate students and that there are 89 courses being conducted by this university. I don't know how much money the University of Washington is spending on this program, nor what the percentage of Federal grants to total contribution at the university the National Science Foundation has contributed—perhaps \$160,000 or \$170,000. It seems to me that to a large extent this research business in water should be up to the States in the conduct of these programs. And just how much are you fellows at your universities dedicating?

Let me be specific. For instance, at Colorado University, I find they have \$101,000, here, and they have another \$60,000 for another study. That is about \$160,000 of Federal contribution.

Now, Dr. Morgan, tell me what your school is doing.

Dr. MORGAN. May I ask the projects that the \$101,000 sum is attached to, and the \$60,000?

Mr. WESTLAND. One is for facilities in field research in atmospheric sciences. The other one, Mr. Cermak is studying electrokinetic potential fluctuation method for investigation of turbulent flow, to the tune of \$50,900. And Mr. Yevdjevich has an analysis of river flow sequence. A total of about \$160,000. And I would like to know what Colorado State University is doing.

Dr. MORGAN. Do you mean what we are doing in addition to this?

Mr. WESTLAND. Yes. How much is the State of Colorado contributing to your program, how many professors, students and so forth do you have working in this area?

Dr. MORGAN. They will certainly have to be approximate figures, because I have not brought out this tabulation. However, I can supply you the accurate information.

Mr. ASPINALL. Without objection, the information will be placed in the record.

(See p. 145.)

Dr. MORGAN. I would estimate that the current level of State support at our institution that is used in collaboration with the Federal funds that you mentioned—and there are others, too, besides those two—the current level of State support is on the order of about \$350,000 a year.

Mr. WESTLAND. That would be State?

Dr. MORGAN. That is my idea.

Mr. WESTLAND. Could you give me an idea of how many students or professors you have working in this area?

Dr. MORGAN. There are about 60 graduate students in our fluid mechanics and this watershed management program mentioned earlier in my comment. The number of professors involved on a full-time equivalent basis—and you understand what I mean by that—the number of professors involved on a full-time equivalent basis would be quite different from the number on a head count basis. For example, here is a professor of civil engineering who is devoting one-fourth of his time to the work that you are inquiring about. He is one person, but he is one-fourth of a full-time equivalent professional person. The full-time equivalent staff would be on the order of 40. That would be my estimation.

Mr. WESTLAND. How big is your university?

Dr. MORGAN. We have a total enrollment of 8,000-plus, with a graduate enrollment of about 9 percent of that total.

Mr. WESTLAND. So you are contributing a very substantial portion, then, of your staff at least, to this water research program?

Dr. MORGAN. We feel so, yes, sir.

Mr. WESTLAND. Let me get to Dr. Aldrich of the University of California. That State with 18 million people in it. I haven't added up all the various University of California and Stanford and so forth funds received from NSF. There are quite a few of them. Give us an idea of what the State of California is doing. Are you the University of California?

Dr. ALDRICH. I am the University of California, yes, sir.

Mr. WESTLAND. Then just confine your remarks to the University of California.

Dr. ALDRICH. With reference to water?

Mr. WESTLAND. That's right, just water research programs.

Dr. ALDRICH. First of all, as a general order of magnitude, within the division of agricultural sciences, which functions on four campuses of the university, Davis, Berkely, Riverside, and Los Angeles, there is for every dollar of Federal money that comes for the support of research, \$12 provided by the State of California. This gives an indication of the relative support from the two bodies.

With respect now to the number of people engaged in water research in the university, I would, first of all, point out that the three-quarters of a million dollars which I said this morning in my statement moved through the water resources center is in addition to moneys that come to agriculture, or come to law, or come to engineering for other projects related to water. This was the specific amount budgeted by the State of California for researchers and administered by the center. But the center, in addition to the three-quarters of a million dollars which it distributes among faculties on

one campus or another, also serves as the focal point for information gathering for knowing what goes on in water research, regardless of the agency within the university that is involved. To come to a figure which suggests the number of full-time equivalent people in the University of California engaged in water, I would say easily in excess of 100.

MR. WESTLAND. One hundred professors, that is?

DR. ALDRICH. One hundred people, that is correct, engaged in water research of one kind or another.

I am also aware of the fact that out of the moneys allocated to agriculture alone for water researches there is in excess of \$2 million worth of water research there. If one was to take the amount of money allocated to engineering on the various campuses or to other disciplines, the amount would be greatly in excess of that in agriculture.

MR. WESTLAND. If I may sum that up, are you saying the University of California is spending, let us say, about \$2 million annually on water research?

DR. ALDRICH. That is correct, sir. This is all ramifications of water research.

MR. WESTLAND. And we said about 12 to 1, State funds?

DR. ALDRICH. That is correct, to Federal moneys.

MR. WESTLAND. That would add up to, say, \$150,000 in Federal funds for water research?

DR. ALDRICH. For water research.

MR. WESTLAND. And \$1.8 million Federal funds, or \$1.5 million Federal funds?

DR. ALDRICH. No, the other way around.

MR. WESTLAND. \$1.5 million State funds?

DR. ALDRICH. That is right. I would point out that all salaries of investors, professorial appointments in the University of California, are paid for by the State.

MR. WESTLAND. Dr. Tinney, what is the student body of Washington State University?

DR. TINNEY. 8,200, sir.

MR. WESTLAND. And that university is spending over \$1 million a year in water research. Your State is spending about \$1,800,000 for the University of California with a student body of what, 75,000?

DR. ALDRICH. 62,000.

MR. WESTLAND. Can you give me any idea what the State as a whole is doing in water research, in the expenditure of funds? Would this go to Stanford?

DR. ALDRICH. Stanford is a privately endowed institution and whatever in the way of State funds goes to Stanford, I have no knowledge.

MR. WESTLAND. And University of Southern California?

DR. ALDRICH. That is a privately endowed institution and the allocation of State moneys to it I don't know.

MR. WESTLAND. Are there any other schools in there?

DR. ALDRICH. The University of California is the principal tax-supported research agency of the State.

MR. WESTLAND. The gentleman from California, Mr. Johnson, a good friend of mine, indicated the State of California was doing a tremendous amount of work in this field. I don't think these figures quite bear that out, do you?

Mr. JOHNSON. I think that these figures would add up to a little bit more than what the doctor has given us, here. The doctor I think has further explanations on that. And also the number of graduate students in this field we have is sizable.

Mr. WESTLAND. I didn't ask the doctor how many students they had. You might give us an approximate figure on that.

Dr. ALDRICH. Undergraduate students and graduate students are involved in studies that relate to water. It would easily be in excess of 100, too.

I would comment, Congressman Westland, that when we comment on moneys for research, versus moneys for works and activities related to water, we have two different things, here.

Mr. WESTLAND. I quite understand that. This is on basic research and not applied research.

Dr. ALDRICH. So my figures related entirely to fundamental research.

Mr. ASPINALL. The committee will stand in recess until 1:30.

At that time the gentleman from California, Mr. Johnson, will act as chairman.

(Whereupon, at 12 noon, the committee was adjourned to reconvene at 1:30 p.m. of the same day.)

AFTERNOON SESSION

Mr. JOHNSON. The Subcommittee on Irrigation and Reclamation will open its hearings for this afternoon's session.

We were hearing from Dr. Morgan and his group and there were questions being asked by various members of the committee.

The gentleman from Colorado?

Mr. ASPINALL. Dr. Morgan, you may answer these questions or have anyone of those who are with you answer the questions, if you will.

I have pretty much come to the conclusion that the principal justification for this program which has been made so far by the statements made here in this room by those appearing for the Department and by your group this morning, as well as those appearing before the Senate committee, is the fact that new emphasis would be placed upon water research, which in turn would result in training more scientists and technicians in this field.

If this is true why don't we just frankly admit that this is an aid to education program carried on by the Federal Government in addition to what we have at the present time?

I would like to have any comment you might have in this respect.

Dr. MORGAN. I would be glad to comment, Mr. Chairman. If one wishes to describe it in these terms I think that would be an appropriate description, that it is an aid to education.

Its primary purpose, however, is to facilitate research into specific problems to obtain specific answers for the guidance of State and other personnel, private enterprise, Federal establishment of personnel in seeking solution to problems with which they deal, problems in the field of water.

An incidental byproduct, as I see it, but a very important byproduct of the effort, is the graduate training which is inevitably intertwined with research work which goes on at a university campus.

Mr. ASPINALL. Which is primary, the Federal aid to education program or the research program? If it is primarily Federal aid to education then this committee should not have jurisdiction.

Dr. MORGAN. I think the figures which the bill calls for give a rough approximation as to the apportionment of this emphasis.

If I may draw an analogy from an area of economic activity where the product is a joint product—the growing of sheep for the production of meat, which is the primary purpose of the sheep industry in this country, has an inevitable joint product in the form of wool, which is also a valuable commodity. Yet I wouldn't know just how to approximate the relative importance of those two things, but I would say offhand that the value of the meat produced in a sheep-and-lamb operation is probably eight times that of the wool. However, when you produce one you automatically get the other.

Mr. ASPINALL. I can understand that all right, but the bill comes before us, at least so far as title I is concerned, almost purely and simply as aid to universities; I want to be sure that we are not caught here in an educational program rather than in a research program.

Dr. MORGAN. It is a matter of interpretation of emphasis. By the same token, there is an element of aid to education in—well, just to pick an unlikely example—in the school lunch program of the Department of Agriculture which, as I understand it, is primarily aimed at facilitating distribution and disposal of surplus foods.

It is not difficult for me, at least, to say that this is an activity of the Federal Government which has the aspect of aid to education.

Mr. ASPINALL. I will not argue the point with you. I imagine a child who eats would be a better student than one who is not well fed, but the school lunch program is not handled by the Committee on Education and Labor but the Committee on Agriculture.

Dr. MORGAN. Yes. To me this makes the point that to my mind this bill is not before the appropriate committee of Congress.

Dr. OSBORN. A clue might be derived in the manner in which funds would be handled. Without exception, universities are usually handled by the research administration. If it were educational it would be handled by the instructional group.

At Penn State, for example, this would be administered through the vice president for researches office.

Mr. ASPINALL. That is the way funds are handled at the present time for the agricultural extension services?

Dr. OSBORN. Not extension, but agricultural research services. All of our research funds are handled this way. This might be a clue.

Mr. JOHNSON. Dr. Aldrich, have you something to add?

Dr. ALDRICH. Might I comment about the relationship between research and education which is at the point of Congressman Aspinall's question.

I would simply go back to that point in time when the institutions of which we are members, the land-grant colleges and universities, were established.

Traditionally research or education involve the classical disciplines of the law, medicine, and the ministry.

As the land-grant institutions came on the scene 100 years ago there was added to these traditional pursuits also education or research dealing with, among others, agriculture and the mechanic arts.

We found for the first time we had little in the way of information to pass on in an educational way to students because we didn't have such information, and we began a process of research in agriculture and in the mechanic arts to develop information that could be passed on to people.

Research, as I think members of the group gathered here today, is the very heart of the process of gathering information, and it is the responsibility, we feel, of educational institutions once information has been sought out and gathered by the research process that it be shared.

You can never in this instance divorce the research process from the educational process.

Mr. ASPINALL. Yet, the great research programs of the world, great solutions found, have almost invariably come out of individual research, haven't they, and private enterprise, rather than coming out of such programs as are contemplated here and those where you have agricultural research in the universities today.

Dr. ALDRICH. That is not so, sir. When it comes to agriculture the United States leads the world in agricultural science——

Mr. ASPINALL. I am not only talking about agriculture, I refer to electricity, engineering, mining activities, cures for diseases, and so forth.

Dr. ALDRICH. No, sir.

Mr. ASPINALL. You mean discoveries in those fields mostly came out out of schools?

Dr. ALDRICH. The source of the basic information which led to the application which you have described originated for the most part within educational institutions.

Mr. ASPINALL. You are just telling me that a kindergarten or first grade is fundamental to any other operation. I agree with that.

What I talk about here is the direct answer to direct problems that we must have before we have this field covered.

I am trying to get you folks to tell me why this is not a Federal aid to education program rather than a specific research program which this committee has jurisdiction over.

Dr. ALDRICH. I can only respond in this fashion. Let us take medicine. I will come to the water but I am trying to point out that the advances today—and I don't care what field of applied science, be it agriculture, medicine, or what, is related to the whole research program, basic research program, that our institutions of higher learning are pursuing.

As a fine example of this, the great medical facilities in the Boston area, the great hospitals of Boston, are being gathered around now, a program headed by Harvard because they realize sophistication of medical sciences depends upon a fundamental research institution like Harvard——

Mr. ASPINALL. Harvard, you know, is a pretty up-to-date suggestion—but go ahead.

Dr. ALDRICH. I am pointing out a fact where some fine institutions were not associated with that institution but have become so because of the need to relate research and education.

Mr. ASPINALL. We could have gone to Johns Hopkins just as well.

Dr. ALDRICH. When it comes to water, the principal source of fundamental information which in one fashion or another is applied by private industry will come in major part from your institutions of higher education, such as we represent here.

Industry applies. Some industry has sufficient in the way of resources to do fundamental research, but insofar as the long haul is concerned it will be institutions such as we represent that will be continually expanding the knowledge which is so important.

Mr. ASPINALL. Does anybody else want to—

Dr. ALDRICH. I say that without reservation.

Mr. ASPINALL. As the language of S. 2 stands, grants to one or more universities will be pretty much automatic. One of you doctors this morning suggested that the universities have a free hand in the research without very much oversight on the part of the department. In other words, there would not be a requirement that the university submit a request supported by a specific program of research.

It has been suggested that the grants to the State universities not be automatic but that they be made to those universities that are in the best position to contribute and which present a program which the Secretary determines will fit into our overall water research effort.

Do either of you wish to comment on that suggestion?

Dr. YORK. I think this relates to some comments we made. First of all, Mr. Chairman, I would emphasize again that three-fourths of the total funds which would become available in this program, fully implemented 5 years hence, three-fourths of these funds would be under the direct control of the Secretary, and he could allocate these funds wherever he felt the greatest need existed and whatever institution could best serve that need.

Mr. ASPINALL. Which he will not do so far as the legislative history of this bill is concerned and so far as this committee is concerned.

We will just not permit that overall broad authority, Doctor.

Dr. YORK. My point was that according to the legislation as now written this would be the case.

One-fourth of the total amount would go to the State, colleges, or universities, divided on an equal basis among the 50-some States, and Puerto Rico presumably.

It was our thought that each of the State universities has certain areas of excellence here which can make a significant contribution to its whole program.

There is no one State university which excels in all areas of engineering, law, agriculture, medicine, and so on, but each university has certain areas of excellence which can be supported, programs should be implemented through these research funds.

It would be our contention there would be great merit in making funds available to every State so that these programs could be implemented where they had staff and facilities to do a good job, so they could deal with local problems.

Here again I would emphasize that every State has certain unique local problems which demand special attention which I would contend only a local institution can concern itself with most effectively.

Mr. ASPINALL. Would you permit the Secretary to go out and hunt for those particular areas of need or would you make it incumbent upon representatives of the institutions involved to present their case to the Secretary?

Dr. YORK. I would take the latter course, it would be incumbent upon the institutions to identify the problems, make recommendations, and proposals with respect to research, and hopefully the Secretary, if he had such authority, would concur in supporting that research.

Mr. ASPINALL. The related question goes to the freedom of the universities in the research that is to be accomplished. I think you touched on this generally in your presentation. Should the universities have complete freedom of action; and, if so, how can it be determined whether the research is not just duplication of research work being done elsewhere?

You touched upon that but I would like a direct answer.

Dr. Morgan?

Dr. MORGAN. Yes, sir. I would like to comment in two parts. First, with respect to this matter of the freedom that the university has in assigning the research funds, some people can say things better than others, and there are many people who can say them better than I.

I wonder if I might quote here from a paper which was presented at a symposium this past summer by Mr. Joseph L. Fisher, president of Resources for the Future.

He was discussing this topic generally, and not with respect to this bill, the subject of freedom of research to determine the avenues of his inquiry.

He says:

It is customary to call for a balance of research programing. By that I mean the application of the research time and dollar where it is judged to be likely to return the greatest benefit to society and to science.

He asks:

Who makes these judgments and against what standards?

He says:

In this question lies the nub of the difficulty. Here reliance has to be placed on the wisdom and intuition of those in charge of allocating the time and the funds, the depth of their knowledge of the subject field, their capacity to appraise research scholars and research approaches. One hopes they will allow much scope for the initiative of the individual scholar and plenty of room for the offbeat proposal.

To me this expresses succinctly the philosophy that if you will permit an inquiring mind to roam pretty freely over the territory of the problem that you are most likely over a period of time to ferret out the answers, if you please, to arrive at the unsuspected avenue that unlocks the door that is closed to you.

This is a kind of abstraction and requires a lot of faith on the part of the administrators. Here I talk from the point of view of a campus administrator. It requires a lot of faith in the process.

As it is put in this statement, you place reliance on the wisdom and intuition of the people who direct those things, and so honestly I have no great fear that research funds of the magnitude contemplated under section 100, allocated to the States for application in a multidisciplinary approach to water problems, I have little fear that they would be frittered away in frivolous fashion.

Mr. ASPINALL. You have given that answer and I am inclined to be in agreement.

I am also inclined to be in sympathy with the general taxpayer and the need to prevent duplication.

Do you think that the Secretary of the Interior administering this program should set up some general criteria within which all funds authorized and expended under the provisions of this program should be considered?

Dr. MORGAN. Yes, sir; I think it would be appropriate that he do so.

Mr. ASPINALL. Do you think that such criteria can be found by the representatives of the Interior Department working with the university officials who will be involved?

Dr. MORGAN. Yes, sir; I think they can.

Mr. ASPINALL. You indicated you had gone over the testimony we received from Government witnesses. I am sure you noted the committee's concern with respect to coordination of all Federal water research programs.

I would like to have some comment from either or all of you with regard to any possibility of success in the coordination of these agency programs.

Dr. MORGAN. I think this problem breaks down into three segments, at least three. One is the problem of coordination between States and within the States themselves, or within a campus itself, particularly with reference to the expenditure of section 100 funds.

The second problem is one of coordination between the Government departments on which much of the earlier testimony centered, and the third one is the problem of coordination between the Federal Government's in-house research program and what is going on out here in the States.

It might be useful to try to answer your question in terms of these segments.

First of all, with respect to the coordination problem out in the States, this morning we indicated rather more than ordinary success, we feel, of the State land-grant institutions in coordinating their efforts as between States, through their interregional committees, and so on.

More particularly with respect to that, the language of this bill states in section 300 that the Secretary shall arrange for the regular cooperation of all agencies of the Federal Government concerned with water problems, of State and local governments, and private institutions and individuals.

The Secretary shall arrange for advice and cooperation to assure that the programs authorized in this act, which seems to me to be the important language there, programs authorized in this act will supplement and not duplicate established water research programs.

As I read this it places on the Secretary responsibility for seeing that anything financed under this act does not duplicate work which is already underway, and to assist him in that it provides for the assembly of a general catalog so that the inventory, all the work going on, is shown so you can see what you are duplicating. You have to know what the other fellow is doing.

Mr. ASPINALL. Do we have at the present time a catalog of research activities so that anyone engaging in research contemplated by this legislation would be able to interpret whether or not there is a duplicatory program? I speak as a layman, and I have read some terms here which mean nothing to me.

I just want to know if we have a catalog so that you can tell whether or not you are duplicating other research.

Dr. MORGAN. The scientists themselves have a lot of this, but so far as I know there is no satisfactory overall catalog as yet.

I would like to ask Dr. Aldrich to comment, but I want to get back to my main point.

Mr. ASPINALL. I will let you get back.

Dr. ALDRICH. I shall simply add this, sir: I know of no single catalog. However, I am aware that the agencies involved and commented about in previous testimony have within themselves catalogs.

I can go to my own experience in agriculture, to what Dr. York referred, a master file of research available to every State, so at least from the agricultural side we would know what everyone is doing in water research from funds made available via Hatch Act or other Federal funds to agriculture.

Last year for the first time there was brought together in California a voluntary group of universities concerned with research on water, specifically hydrologic research. This was the first time that educational institutions, recognizing the need to bring together what each is doing so as to get a more efficient approach on water, would get together and devise such a listing or cataloging for themselves.

Here the educational institutions are commencing. I have cited how agriculture has done so.

I would also point out that the scientists engaged in water research, regardless of affiliation, in no small measure have standing in their professional relationship based upon how their colleagues view them. There are professional societies of men engaged in water research. There are professional journals to which these scientists contribute. In this manner there is a cataloging of water research.

Therefore, I would say that if, as this bill states, there would be a department responsible for developing a single catalog, there is great help already in motion for such an effort.

Dr. MORGAN. To continue with the third aspect of this problem of coordination; namely, the one of coordinating the several Government agencies, Federal Government agencies, those inside the Federal Establishment, as I indicated this morning, or intended to indicate, we from the universities feel just a trifle impertinent in making suggestions on this score although the question has been asked and I certainly intend to respond to what I think might be done in this regard.

It seems to me that the language of this bill before us clearly points toward the need for doing this, but it is not a bill to facilitate coordination of the Government agencies.

How does it point that way? Again, in the language of section 300, it states that each Federal agency doing water resources research and investigation shall advise the Secretary of the Interior at least once annually of work underway or scheduled by it. This is part of this cataloging effort.

At another point the bill refers to the catalog responsibility being transferred to some other agency. What other agency would be in a position of responsibility here?

If I may draw the analogy of our own campus, if we have two coordinant colleges or a division whose efforts bump up against one another, and there is a problem of coordination there, we go one step

above this to effect the coordination. Therefore, as I understand the Federal Establishment, an appropriate place for this to be done would be in the Office of Science and Technology. I understand this Office is an arm of the executive branch and has a person working on this very problem now. At least that is my understanding of what Mr. Ackerman is doing for the Office of Science and Technology.

Since you asked the question of whether we have any suggestion—is this what you said—of how this might be achieved, my answer would be that it seems logical the responsibility for doing this rests at that level and presumably the authority for doing it is there.

I would like to add one final footnote. I was quite concerned about the committee's concern with this aspect of the problem when I read the transcript of the earlier testimony, and in my own amateurish way I drafted a proposed amendment which seemed to me to strengthen the hand of the agency responsible for administering this act in achieving coordination of the effort to the extent that they can achieve it, and also have a clear expression of Congress intent that there not be unwarranted duplication.

I don't know that this is appropriate to propose at this time.

Mr. ASPINALL. Go ahead and read it. We would like to have it in the record. That is what the hearing is for.

Dr. MORGAN. I had some copies prepared.

Mr. ASPINALL. You have already explained it. If you will just read it into the record.

Dr. MORGAN. In section 304, it is about six lines long, let me read it, and my proposed amendment would be in addition to that.

It now reads:

Contracts or other arrangements for water resources research work authorized under this act may be undertaken without regard to provisions of section 3684 of the revised statute when in the judgment of the Secretary of the Interior such payments are necessary to facilitate research.

There I would place a colon and then add this statement:

That funds appropriated pursuant to sections 100(b) and 200 of this act—these are the funds the Secretary may allocate—

shall not be expended for any research, investigation, or experiment until the Secretary of the Interior has approved a finding that said expenditure cannot reasonably be expected to cause undesirable duplication of research investigations, or experiments that have been or are being made by a Federal agency or otherwise supported by Federal funds, said finding to be based on, among other things, examination of scientific and engineering literature and the catalog maintained pursuant to section 300 of this act.

Mr. ASPINALL. That is fine.

Dr. Morgan, in section 102 there is language which would authorize the availability of funds not only to conduct research but also for administration and for the purchase of land and construction of physical facilities and administrative planning, direction, and so forth.

I interpret this language to apply, also, to grants made to universities and colleges.

Do you believe it is appropriate that research grants of universities are to be used in the manner suggested?

Dr. MORGAN. I know this to be a sensitive subject in some areas. Even so, my answer is that it is not inappropriate to do so. If the principal limiting factor to the conduct of a needed research effort

is the absence of appropriate physical facilities, then I think on the general proposition that you tend to "first things first," that this is an area you need to clear up in order to do it.

Surely, in the case of rental of land there are problems in virtually every State where research would need to be conducted on land not owned by the institution or by the State, and land, the ownership of which needs not to be vested in the State but which it needs for a short period of time, you rent it.

Mr. ASPINALL. Do the rest of you doctors concur in that statement?

Dr. ALDRICH. I do.

Mr. ASPINALL. Apparently there is no disagreement. You apparently concur.

There has been quite a bit said about the shortage of scientists at the present time and the shortage of qualified teachers. Do you think that there are sufficient qualified teachers and sufficient scientists to start this program out as contemplated by the legislation as presently written in the period that is provided for in the legislation?

Dr. MORGAN. Yes, I do, and let me provide some statistics on this, statistics which at first blush seem to be in opposition to the flat answer that I have given you.

In 1960, the National Register of Scientific and Technical Personnel listed 2,500 people with some professional competence in one of the hydrologic categories and 800 of those reported a hydrologic specialty. Two years later, in 1962, the same register shows 881 reporting a hydrologic specialty.

This does not necessarily mean that in those 2 years 81 net additions occurred to the total inventory of that kind of trained manpower because the basis of listing in the register at the two periods may not have been precisely the same, but at any rate it indicates a higher figure in 1962.

Of the 881 hydrologists reporting in the national register in 1962, only 4 percent of them, that is to say, about 35 of them, indicated that teaching was their principal work activity. Where were the others? Principally in government departments, State and Federal, some of them engaged in the very kind of research that we are seeking to stimulate by this bill, but not teaching as a part of it.

You might say this is a very small core of people already in the teaching profession to take on the job contemplated here and my answer to that would be that the funds made available under this bill would help shift some of those who already have the specialty—a few—over into part-time teaching and often this is all you need at the graduate level. You do not need a man for full-time teaching. You need him to handle one graduate course or handle one graduate seminar and with the funding contemplated in this bill an educational institution has the capability of shifting its personnel load around so that you can apply small increments of technical ability, if you please, to a small portion of the problem. You do not have to deal in terms of the total man. If you have already got him on your staff, if he is aboard, there on the campus, you can shift the emphasis of his work from full-time research to part-time teaching and part-time research and do it in all kinds of various combinations. These institutions are very experienced in doing this sort of thing because we do it all the time in areas of agricultural research.

Of the hydrologists that report, only 5 percent have graduate degrees and this is in contrast to 15 percent of the earth scientists who are on this register and 35 percent of all scientists who hold the doctor's degree, so this in itself is a kind of a rough and raw, ready statistic, which indicates possibly a neglect accumulated over a period of years of emphasizing graduate training in these areas.

The longer we wait to push it along the longer we shall have to wait until both the number of trained scientists are increased and their level of training is increased and our view is that the sums contemplated here for allocation under section 100, which have been referred to in some of the hearings as very modest sums for many of these campuses, is not a very modest sum. This has a triggering effect, a chain reaction effect to stimulate graduate training on a broad scale so that if you can imagine kind of a cost-benefit defense of this \$100,000 that would be allocated to a State you reach the conclusion that you get an awful lot of result per dollar expended.

Mr. ASPINALL. My last question will be directed to Dr. Aldrich and following right along the answer that has been given by Dr. Morgan. You presented this morning, Dr. Aldrich, if I remember correctly, the relationship between the State and the Federal operation as proposed in the legislation. Keeping in mind what Dr. Morgan has stated and what you stated in your own presentation, is it likely that there will be an undue hardship placed upon the States in this stepped-up program for the States to contribute additional sums of money over and above which they now support so that the State will be in a difficult position?

Dr. ALDRICH. No, sir. I do not think the amount of money envisioned in this bill will place undue hardship upon the States. The \$100,000 figure which is direct grant to each of the 50 States, as proposed in 100(a) in essence provides for the support, salarywise plus graduate student assistanceshipwise, for a man and about two helpers. I do not think a State shall be bankrupt by any matching of the resource.

When it comes to the possibility of participating in the \$5 million that would be allocated on a matching basis to the States or possibly the \$10 million that would be allocated to any agency, again I think the magnitude of the researchers already underway in the States would very adequately match that amount of money.

Mr. ASPINALL. Dr. Morgan, you or anybody else, do you see whether there will ever be an end to this program if we authorize it?

Dr. MORGAN. No, sir.

Mr. ASPINALL. That is all that is necessary. Thank you very much.

Mr. JOHNSON (presiding). The gentleman from Florida, Mr. Haley?

Mr. HALEY. I have no further questions.

Mr. JOHNSON. Mr. White, the gentleman from Idaho?

Mr. WHITE. Thank you, Mr. Chairman.

You gentlemen will have to agree that the chairman has been very thorough in his examination of the legislation before us and has probably brought out most of the salient features. There is one particular thing I would like to ask about.

You have talked about a regional committee, a coordinating committee in research in this field, or whatever form it would take. My

question would concern not only duplication but specific needs that are in areas that are not now being particularly considered, such as in the State of California you have the specific need for industrial water, for water for domestic purposes, and the transportation of this water whereas in other areas we have needs of evaluating underground waters, et cetera.

Under this legislation do you think it would be possible that the direction would be to where this great need is at present rather than perhaps some of the areas where we have anticipated great need in the future? Do you follow my question?

Dr. MORGAN. I am not sure that I do, sir. It is possible that Dr. Aldrich, from California, does.

Mr. ALDRICH. I follow it to the extent——

Mr. WHITE. I am thinking this way. At present we have research in the State of California directed in a certain direction, which is the need of the moment, whereas in a State such as my State of Idaho where we have great underground streams of water that are being tapped, bit by bit now, that ultimately we are going to have a problem in that area that may be as extreme in the State of Idaho for other purposes as your present need is in the State of California. I am wondering if you feel that this legislation, allocating this money, State by State or through a regional coordinating committee, would be fair and equitable distribution of the funds so that both of these problems could be approached or do you feel that such a State as yours would receive the lion's share of the money and perhaps this other problem would not receive the amount of treatment that it should receive?

Mr. ALDRICH. I would like, Mr. Chairman, to respond to that question.

Mr. JOHNSON. Go right ahead, Dr. Aldrich.

Dr. ALDRICH. I have supported from the outset, Congressman White, the provision of this bill which allocates to each State, in title 100(a) moneys for the establishment of a research center because I am not a believer in the fact that there can be a few centers of excellence from which there shall originate all good works. I feel that each State has a requirement; it also has a manpower and brain capability that should be supported and therefore to this extent I do not for one moment believe that money should go only to one Federal agency or to one State agency. Each State should have an opportunity to pursue its own needs.

When this comes to the allocation of the \$5 million to the States on the basis of specific requests, contract proposals, or sharing in the \$10 million which the Department can allocate, either to institutions of higher education, public or private, or private enterprise, here the decision is going to be made by the Department, presumably in terms of the research proposals which are in the Nation's best interest. It will be a case here of matching a proposal from Idaho, California, Maine, or Rhode Island, with what the Department of the Interior believes to be a research program that will contribute to the total national benefit.

Mr. WHITE. What I sense in this area will be a competition for this money on the basis of immediate need or the \$10 million portion that the Secretary will have under his discretion for distribution.

In other words, if one State feels their present need for this research in this particular area is more important than the research in some area that may not be acute, until several years in the future, perhaps the lion's share of this money will go into that area.

Dr. ALDRICH. I could only respond to that by stating that whoever is responsible for allocating the \$5 million or the \$10 million on a matching basis should bear in mind that the research should be balanced in terms of meeting immediate need versus longrun need versus applied and basic research. This is a judgment, but I cannot imagine that someone who is knowledgeable and who is concerned simply allocating on the basis of putting out the fire.

Mr. WHITE. I would have to say I agree with you, but in actual practical allocation of funds among the various agencies in the various States of the United States, there is a very keen political competition here in the Congress as to who gets what and for what purpose.

I am hoping that if this legislation is enacted into law that the distribution will be on the basis that you have just suggested.

I should like to ask you a question now specifically regarding your own State, Mr. Aldrich, as to how you allocate funds at present, whether they are allocated for actual instructors, for carrying fellows, for equipment, for laboratories, et cetera.

Dr. ALDRICH. Mr. Chairman, in responding to that question I have brought along with me a statement which relates specifically to that which I would be glad to provide members of the committee and I will simply comment briefly about that, if it would be of help to you.

Mr. JOHNSON. Dr. Aldrich, if you would like, we will include this as part of the record.

Dr. ALDRICH. I would appreciate that, sir.
(The information follows:)

THE UTILIZATION OF FUNDS PROVIDED BY THE STATE WATER RESOURCES RESEARCH INSTITUTES ACT

The question has been properly asked concerning the manner in which the funds made available to the States under the provisions of this act would be effectively used in these water resources research institutes. By tracing the manner in which funds made available to the Water Resources Center of the University of California are administered, a reasonably accurate picture can be obtained of the way resources provided by this act could be expected to be utilized.

The Water Resources Center of the University of California was established in 1957 to "coordinate and stimulate initiative and freedom of inquiry by individuals and research agencies of the university in the problems of water resources development." Funds are provided by the State legislature for research in water resources and for administration of the center as a part of the annual university budget.

The research funds are allocated to specific projects by a coordinating board. This board is composed of: the university dean of agriculture (statewide), ex officio, chairman; the deans of engineering, Berkeley and Los Angeles, ex officio; the director of the agricultural experiment station, ex officio; the director, water resources center, ex officio, secretary; and six academic staff members selected from the various campuses and departments of the university. At present, departments of law, irrigation, engineering, political science, agricultural economics, and earth sciences are serving as appointed board members.

Projects are submitted for consideration to the coordinating board by the academic staff of a wide variety of university departments, although the greatest activity has centered in the engineering and agricultural departments. Projects are usually developed on the initiative of the individual staff member. Where important problems are not being adequately researched, the director stimulates interest on the part of the university academic staff through discussions. When

it appears that no existing department or staff member can undertake a project considered important, the center is authorized and expected to employ competent professional personnel on a temporary basis to undertake the studies. In the 6-year history of the center, such an action has had to be taken only on two occasions. For the most part, the faculty and the departmental administration have been most cooperative in assisting the center to accomplish its mission.

Because of the activities of the director in stimulating specific studies, the projects formally proposed to the center are for the most part prereviewed and, in some cases, reoriented in scope or objectives to conform with the program of the center. Poorly conceived or irrelevant proposals are usually withdrawn at this stage or suitably revised. In addition, the director reviews the budget requested to eliminate cushioning and to provide a realistic level of research activity. At this stage, the staff member may be encouraged to seek extramural sources of support as may be available. Parenthetically, despite these screening processes, budget requests still exceed available funds by approximately 2 to 1 and many important areas of research remain untouched for lack of funds.

The project proposals officially received by the center are then given a thorough technical and financial analysis by the director. He is responsible for advising the board of the exact scope and objectives of the project, the specific water resources problems whose solutions will be aided by the research, the general importance to the problem of the specific work to be done, the minimum level at which financial support might be provided and still obtain useful results and the optimum level of financial support. He is also responsible for making a specific recommendation to the board for the level of financial support (if any) on each proposal formally submitted, subject to limitations of funds and the importance and urgency of the study in relation to other proposals.

Each coordinating board member next carefully reviews the project proposals and the director's report and recommendations. This is followed by a protracted working session at which the director may be called upon to defend any of his recommendations. Additional information and judgments are provided by the board members on the various projects. Specific allocations of the funds available are then made by the board with due regard for the relevance to the long-range and short-range problems of water resources and the availability within the university of the necessary facilities and support capability.

By utilizing the existing organizational structure of the university for administrative support (personnel, accounting, shops, laboratory facilities, etc.), funds provided for the specific research project can be efficiently utilized. In addition, the salaries of the principal investigators and their academic assistants are provided by the departments. The water resources center functions entirely complementary to the educational activities of the department. The center provides financial support for faculty research interests in water resources. Graduate students, through part-time employment, are given useful and realistic research experiences. At the same time, faculty research talents and departmental research facilities are made available at no further cost to the center or to the university.

Notification to the department and project leader of the amounts allocated includes a statement to the effect that the allocation is made with the understanding that it in no way replaces funds which would be otherwise provided for this or other water resources research. This provision reminds all concerned that the funds of the center are to be used for the purpose intended. The director and the ex officio members of the board are usually in a position to notice and correct any deviations from this policy and no difficulties on this score have been encountered.

In the preceding paragraphs, the administrative procedures for the allocation of research funds by the water resources center have been reviewed by way of illustration of the manner in which adequate financial control can be and is maintained, at the same time maximizing the research accomplishments and their impact on water resources conservation and development. Existing university departments and the faculty are utilized to a maximum extent and freedom of inquiry is carefully preserved, to the overall enhancement of the research program. We have not reviewed completely the manner in which research program and policy is generated.

The coordinating board has the primary responsibility for the research program and policy. In the discharge of this responsibility, they are aided by studies undertaken by the director, usually through research needs committees

composed of prominent faculty members from the several campuses. When recommended as necessary, research needs conferences are called, bringing together scientists and professional research staff of national reputation for concentrated study and discussion of the problems urgently requiring research.

In order that the point of view of those responsible for development and utilization of water resources of the State, the water resources center advisory council has been established. This council consists of 24 nonuniversity members chosen to be broadly representative of all interests and points of view from the water leaders of the State. This council meets quarterly to review the program of the center, its impact on the water resources problems of the State and makes specific recommendations thereon, both to the center and to the president of the university.

From the foregoing remarks, it can be seen that the research program of the university in water resources is subject to a number of formal and informal controls which tend to insure effective use of the funds provided for this purpose. Use is made of the existing administrative machinery of the university to a maximum extent. The advice and counsel of the research staff of the University of California and other universities throughout the Nation is called upon. The program and its impact is reviewed by a broadly selected advisory council of nonuniversity experts in the State's water industry. One of the primary concerns of the center is that its limited financial resources be used effectively for research and not diverted to administration or be allowed to replace funds otherwise available from other sources. This concern is shared by the advisers of the center with the result that the water resources research by the University of California, though admittedly inadequate in its extent, has been efficiently and effectively administered.

There remains to be demonstrated that there is important research which is not being undertaken by any research organization but which could be accepted by the University of California. This same question presented itself to the coordinating board of the center some years ago. The consensus of the university family was that this was indeed true. To obtain an expert independent opinion on the matter, however, this question was posed to the advisory council of the water resources center. Composed as it is of nonuniversity experts on water problems, representing all points of view and all related fields, it was felt that an accurate, independent assessment of the position of the university could be obtained. The resulting "Report of the Water Resources Center Advisory Council," November 1962, addressed to the president of the University of California contains some pertinent paragraphs. Quoting from page 1 of that report, "It is the conclusion of the council that the present research program of the university on water problems is not keeping pace with the complexities and the urgencies which we face. It is our further conclusion that the administrative questions must be squarely faced and that immediate steps must be taken to develop a research program which will be more nearly adequate." On page 4 of this report, the council states: "Not only is the university the logical public institution in which the water research program provided by public funds should be concentrated, but it is recognized as the only public agency equipped to carry the program forward." Again they state on page 4: "We feel the university is capable of expanding its research effort in this field of interest and express our confidence in the center."

The report of the council likewise calls attention to the need for foresight in providing for research. "It is very desirable that the problems of the future be recognized and that whenever possible, research be instituted in anticipation and in consideration of the time when results and conclusions will be needed."

The conclusions of the council in this report are :

"1. The University of California has underway a valuable and far-reaching program.

"2. This program suffers because of inadequate financial support.

"3. The University of California is the logical agency to pursue a broader and more intensive program which will include projects more closely related to those applied problems of immediate urgency.

"4. Effort on these urgent problems must not weaken the basic research program either by the diversion of manpower or funds. In fact, the applied program will only make sense if it is continuously backed up by a strong basic research program.

"5. A program to meet this broader objective as an extension of the program now undertaken by the water resources center should be promptly initiated and adequately financed."

In summary, the experience of the Water Resources Center of the University of California has been cited as an example of the manner in which a university, through its water research institute, can direct the financial resources available for water research efficiently and effectively. During the past few years, the water resources center has received an increasing number of inquiries regarding our administrative procedures and policies from other universities that wish to draw upon our experiences. It can be reasonably expected that provisions will be made for advice and administrative controls equally effective as those of the water resources center. For these reasons, I would urge upon you that the funds made available to the universities under the provisions of this act would be directed in an efficient manner to the accomplishment of the research objectives of the act.

Mr. JOHNSON. You may comment, if you wish.

Dr. ALDRICH. Commenting specifically about our method of allocation the Water Resources Center of the University of California allocates money on a project basis to departments throughout the university on its several campuses based upon, one, the review of the director of the water resources center, a coordinating board made up of the Director of the Agricultural Experiment Station, the deans of engineering at Berkeley and at Los Angeles, the director of the water resources center, plus six faculty members drawn from the faculty at large, presently representing economics, political science, engineering, irrigation, law, and social science.

The projects flow in from the various staff members and are first scrutinized by the director of the water resources center, who, counseling with each of those who originate a project, get the proposal into the best shape possible for presenting to the coordinating board that has the final say about the allocation of resources, both to project and in amount.

Recognizing that the University of California plays a very important role in the production of information that is helpful to the development of the water resources of the State of California, we have in addition to this coordinating board of water resources center, a water resources center advisory board made up of 24 outstanding non-university people drawn from various professions, vocations and affiliations in the State concerned about water—irrigation, district people, water lawyers, et cetera, and these people sit down and serve as essentially a check and balance system on the directions, attitudes and programs of the water resources center as an outside agency, bringing to us continually the information produced for example by our State department of water resources, which is an action service agency and is dependent upon the university for the data that sets them in motion along certain programs, insuring that the university is extensive to the needs of the State, insuring that we are embarked upon programs that will be productive of information that one day out the State may need to have, because this is one of the great problems that we face today, is shortsighted research effort geared only to meeting the needs wherein our own State right now, concrete is being poured for water projects, the data for which should have been produced 10 decades ago and which we know if we had it today might take on somewhat different form than they are presently doing. This is simply our shortcoming but we hope to be in better position with respect to future works.

Mr. WHITE. In your State, how much of your research is applied research and how much of it is basic research out of the funds that you specifically enumerated here this morning?

Mr. ALDRICH. I commented this morning about \$2¾ million worth of research; three-quarters of a million being granted by the water resources center, which is a State appropriation, \$2 million being that amount of research money within the framework of agriculture related to water. This is a very difficult question to answer, since it is neither black nor white, what constitutes fundamental or what constitutes basic. I would only say that inasmuch as we look to the university as being the primary fundamental research agency that the majority of our research projects are in the fundamental category. It is the production of new ideas which one day will be applied in this fashion or that fashion, depending upon the need and circumstance that is the university's unique responsibility, so as the man responsible in our water resources center for the coordinating board, I was particularly concerned that we do not get engaged in simply cookbook research work, which involves applying ideas long since determined but rather to be involved in the exploration of new ideas related to water.

Mr. WHITE. Could you put that forth in a percentage figure for me?

Dr. ALDRICH. I said the majority. I am talking about 75 percent.

Mr. WHITE. I would have assumed it would have been closer to a 50-50 division, had I relied on my own prognostication.

Dr. ALDRICH. I would have said, Congressman White, that at an earlier time this would have been the picture, but as we constantly evaluate how to spend the taxpayer's dollar most effectively, we continually come back to what is the role of the university in this research effort and we feel that more than anything the university must concentrate on the fundamental research effort, but depending upon the times you will engage in applied research if there is no other agency in the State to do so, but we are moving in the direction of greater emphasis, not a 50-50 split, upon basic research.

Mr. WHITE. It seems the program that you should follow.

I want to compliment you on preparing very excellent testimony here. Thank you very much. I have no further questions, Mr. Chairman.

Mr. JOHNSON. The gentleman from Texas, Congressman Roberts?

Mr. ROBERTS. Thank you, Mr. Chairman.

Dr. Aldrich, I apologize for leaving this morning and just getting back. If these questions have been answered, please say so and I will pick them up in the record.

How do you plan to spend these funds by institutions? Will you allocate this for your present faculty on a subsidy for teaching for your people who are skilled in this thing plus your graduate students? How will you actually allocate it in the various institutions?

Dr. MORGAN. Mr. Roberts, this question was asked a moment ago and the California answer was given in the form of the statement which is on your desk, but we can give you the difference from State to State, how it would be used, and in anticipation of this question I asked the members of the team to come prepared to respond for this type of question, so may I ask—

Mr. ROBERTS. If it has been answered, I will pick it up.

Dr. MORGAN. It has for just one State. We would be glad to give you one more example of another State as illustrative of the work that would be done.

Dr. Osborne, would you comment on how Pennsylvania would propose to use the funds?

Dr. OSBORNE. I would be glad to, Dr. Morgan.

Mr. Roberts, may I say in the first place that the funds under title 100(a), we would use entirely for direct costs. In other words, the indirect costs would be taken care of by the university, by the State, and these amounts in our case to 38 percent, the direct cost, on an average, so, therefore, we would be putting into this research actually \$138,000.

Mr. ROBERTS. I think you are begging my question, though. Will you use your regular faculty as a subsidy for those skilled people?

Dr. OSBORNE. I thought you wanted to know how we would spend the money.

Mr. ROBERTS. That is what I mean.

Dr. OSBORNE. I am saying in the first place the total \$100,000, if that was the appropriation, would go entirely for direct costs. This means for salaries of people who are doing research specifically on the project and for equipment and supplies but not used for any indirect costs.

Mr. ROBERTS. If it is for subsidy for salary, I am against it; if it is for something you are going to hire additional people and do a job, I think it is a job that has to be done.

Dr. ALDRICH. This is the point I was going to make. This money would not be used to release State moneys already appropriated for this source to some other activity. That is put forth in my statement. What we need are new minds to go into new projects and this money that we would get would go for that purpose.

Mr. ROBERTS. Thank you.

One more question: Where you have a State that is already doing as a State job a rather substantial amount of research, how are you going to correlate the work and how are you going to correlate it by State between States? You would not want to do the same job in four different locations all on Federal funds. How would you determine who is going to establish some type of priority where you already have an operating institution in the State?

Mr. MORGAN. We had rather extensive discussion of this topic right after lunch.

Mr. ROBERTS. Thank you.

Would there be any objection where there is an institution set up now, an agency of the State, a water commission or resources commission, requiring some type of coordination? Would there be any objection to that sort of program?

Dr. MORGAN. If I understand your question, I would say there certainly would be no objection to it. To the contrary, it will just be commonsense to try to achieve it on a local level, even if the Secretary, in handling the section 2 funds seemingly had interest in that.

Mr. ROBERTS. Water is one of our problems. The State spends maybe \$2,500,000 to \$5 million a year, trying to work out water sur-

veys, control problems, evaporation; and certainly this could be very helpful to them.

I haven't seen the budget this year. Where they have already covered one field it would be better if they would go into another field. Would there be any objection to some type of language in here requiring some type of correlation where there is already an operating institution?

Dr. MORGAN. No, sir; in fact, I rather think there is that language in here, and there was proposed, in an amendment which I offered earlier this afternoon, language that would fortify that.

Mr. ROBERTS. I apologize, Mr. Chairman, for being late, but I could not help it. That is all I have, sir.

Mr. JOHNSON. Does the committee staff have any questions?

Mr. McFARLAND. I think there are two points we need to clarify the record on, Mr. Chairman. First, I believe Dr. Osborne, the figures which Mr. Westland was quoting this morning came out of information furnished the committee by the National Science Foundation. The table indicates that this is a list of basic research grants in fiscal year 1963. However, the table is not clear on whether activities involved in these grants cover 1 year or more. Dr. Osborne, in an off-the-record comment to me, indicated some of these grants covered 3 years. Did you want to comment on that?

Dr. OSBORNE. I would just like to say that in using figures for comparative purposes as we had done earlier this morning, you have to know what basis they are on and the figures I had given were strictly an annual figure for this year, for 1 year, whereas the National Science Foundation grant that I am sure Mr. Westland was referring to was a 3-year grant. We cannot very well compare 3-year figures with 1-year figures.

Mr. McFARLAND. Specifically, then, Mr. Chairman, in order to relate these grants to annual expenditures we would have to supplement the information furnished by the National Science Foundation as to the period covered.

Now, Dr. Morgan, as you know, the Senate amended the bill which you originally testified on.

Dr. MORGAN. Yes, sir.

Mr. McFARLAND. And section 100(a) has a provision which indicates that a State may designate not only a land-grant college but one or more colleges.

As I read the language they could designate four or five or six. First, your comments on that; and second, whether you interpret the language to mean each one of the designated colleges would be entitled to a \$100,000 grant.

Dr. MORGAN. Our interpretation is that the grant would be on a State basis and that any fragmentation of the sum—well, that the designation of more than one institute would call for a division of the sum.

Our position with respect to this is that we think this would not be in the best interest, maximum dividends from the funds.

If you please, the application of the old military principle of concentration of force is a very good thing, I think, to use here. This does not mean that only one institution should participate in it, but we feel there should be only one institution for expenditures of the magnitude contemplated here.

If they are parceled out, fragmented, there would be a frittering away effect that I think—that we think would be inevitable.

There are many, many States in which their competence, the State competence in achieving coordination of effort or combining the effort of the staff of two or more State institutions, is quite good. I would recite my own State as an example. There are some research projects in which the University of Colorado and Colorado State University personnel are working very closely, but it is one project, with one central direction, so that there isn't the hazard of having two projects covering essentially the same paths. In another instance, those two institutions plus the Colorado School of Mines are engaged in a cooperative graduate research program. This is just a small example of how easy it is to do this; so, to summarize, the position of the association that we represent would be that the original language was better on this score; and that language which would permit the division of the sum between two or more institutes is not the most desirable language.

Mr. McFARLAND. This would limit the grant to a land-grant college then?

Dr. MORGAN. Not necessarily. I think the original language said "to institutions as defined in the old Morrill Act," which is the land grant. I am talking now about page 2 of the original bill; it is page 2, line 15, but on line 17 it says, "or such other institutions of higher education as any State shall determine."

Mr. McFARLAND. Suppose the State decided, instead of giving it to the land-grant college, to give it to some other college?

Dr. MORGAN. This is permitted.

Mr. McFARLAND. Under your interpretation it is the State that makes the decision?

Dr. MORGAN. Yes.

Mr. McFARLAND. That is all.

Mr. JOHNSON. Dr. Morgan, I want to thank you and your associates for a very fine presentation.

I presume that in your paper on the 10-point program you spelled out there is plenty of need for basic research in these 10 items to more than justify this amount of money that is called for in the specific bill that we are hearing?

Dr. MORGAN. Yes, sir. I would not want this to be represented as a complete cataloging of the needs as we see it, the paper that you referred to. We strongly urge your favorable consideration of this bill and we honestly feel that the dividends to be derived therefrom will be very large and without end.

Mr. JOHNSON. Dr. Aldrich, there is one question I would like to ask you. In our State how much assistance, if any, do we get from our large public water agencies, such as the Metropolitan Water District or Imperial Irrigation District—

Dr. ALDRICH. How much do we get from them, or give them?

Mr. JOHNSON. How much do we get? Do they participate in the way of financing any of these research programs?

Dr. ALDRICH. There have been some specific contracts between public agencies such as MWD or the Imperial Irrigation District for the investigation of a particular problem. However, the amount of information flowing from projects which these agencies sponsor versus the amount of information flowing to them in total from all work

in the university is very different because they get far more information that they are actually providing resources for.

Mr. JOHNSON. I notice serving in the Government at both the State level and here that any problem we have out there, whether it relates to the State or another public agency such as the Metropolitan Water District, or our various irrigation districts or almost any other concerning water, whether it relates to a city or county, the University of California is always brought into it. You say, "Here is the knowledge that has been given to us from various programs in the way of research that concerns your immediate project."

Dr. ALDRICH. This is a very good example, Congressman, of the value of fundamental research. It has its impact across all kinds of applied problems. If you were to devote research specifically to a very local applied problem then the opportunity to extend the information to other situations becomes more limited. The value of fundamental research is that it is pertinent to a wide variety of areas with very many circumstances prevailing.

This is why the university is generally brought into problems relating to water, regardless of the agency involved.

Mr. JOHNSON. I want to thank you, Dr. Morgan, you and your group, and if there are no further questions on the part of any members of the committee, or the staff—

Dr. MORGAN. Our thanks to you, sir, and the committee.

Mr. JOHNSON. The next witness is Dr. E. Roy Tinney from Pullman, Wash., representing the Washington State University.

STATEMENT OF E. ROY TINNEY, PULLMAN, WASH., ON BEHALF OF WASHINGTON STATE UNIVERSITY

Mr. TINNEY. Mr. Chairman, with your permission, I will read only excerpts from my prepared statement and then add a few remarks regarding this problem of duplication.

Mr. JOHNSON. Dr. Tinney, I imagine you would want your full statement shown in the record at this point.

Mr. TINNEY. Yes, sir, if it could be.

Mr. JOHNSON. Without objection, it is so ordered.

Mr. TINNEY. My name is E. Roy Tinney. I am professor of civil engineering, head of the Albrook Hydraulic Laboratory, and chairman of the technical committee of the Water Research Center, all at Washington State University, Pullman, Wash. Beyond our campus, I am the incoming chairman of the Hydromechanics Committee of the American Society of Civil Engineers and a delegate to the Universities Council on Hydrology.

I am appearing here today in support of bill S. 2 which passed the Senate in April of this year. My testimony will consist of a short general statement on water resources followed by specific reference to my home State and finally some brief remarks on the details of the bill.

The United States as a whole receives an abundant supply of precipitation. The average value of 30 inches per year is far more than will be required in the foreseeable future. Nevertheless, the Nation faces a serious water problem, because water is frequently neither available at the places and times required nor is it of the quality necessary for health and prosperity.

Shortages, excesses, and poor quality of water have noticeably affected the economy of almost every State in the Union. It may be hurricane-induced floods in Connecticut, or estuarial pollution in New Jersey, or drainage in Florida, or floods in Mississippi, or empty reservoirs in New Mexico, or salt in Arizona, or ground water depletion in southern California, or floods in western Washington and northern Idaho, but the result is the same—each State feels the economic burden of water problems. The national water problem is in reality a tremendous number and wide variety of local problems.

The Federal Government, primarily through the large construction agencies, has traditionally played a major role in water resource development. However, lack of knowledge on the interrelationships among the many variables affecting our water resource has prevented a good evaluation of future needs. We are, therefore, falling constantly behind in meeting the water demand. Bill S. 2 is a modest step toward finding these relationships.

Generally speaking, the need for 50 or less water research centers that bill S. 2 provides can be summarized as follows:

(1) Water resources affect every segment of our society and yet there are few water research programs either Federal or State, that treat this resource from a broad, multidiscipline viewpoint. The various governmental agencies each have specific objectives which are reflected in the research programs they support. Bill S. 2, on the other hand, is directed specifically toward the interdisciplinary approach.

(2) Each State must strive toward optimizing its own water resources, keeping always in mind the great advantages of interstate cooperation. Just as climate, soil, transportation and markets determine a State's agricultural program so do abundance, quality, distribution and demand for water dictate its water resource development. Thus each State's water problem requires its own evaluation and research program. The proposed centers would provide for this individual approach by bringing not only local knowledge to bear on the problems, but, more importantly, local interest and enthusiasm. Thus bill S. 2 takes advantage of the expertise developed throughout the land.

(3) One of the most serious difficulties in developing water resources is the shortage of trained personnel. Indeed most water research centers will confront this shortage in their formative stages and will have to rely at first on the nucleus of staff currently at hand.

Research centers at universities have the unique capacity, however, of not only conducting research but also of simultaneously training young men and women. The very existence of these centers on the campuses of our Nation will be a buoyant factor raising the interest in water resources among graduate students. These centers will also offer direct research experience and, incidentally, some financial support by part-time employment to those students who have chosen some area of water resources for their careers.

Now let me turn to the State of Washington for a moment, because the water resources picture there provides a good example of the need for water research centers.

Washington is fortunate in having an enormous water supply, much of it of excellent quality. The mean daily runoff originating in the State is 68 billion gallons. (Geological Survey Water Supply Paper 1,800, 1963, p. 906.) On the basis of 1,500 gallons total water with-

drawal per capita per day (Geological Survey Circular 456, 1960, p. 8) one-third of this runoff alone would support a population of 15 million. This is more than 5 times the 1959 population of 2,883,000 and 3.4 times the projected 1980 population of 4,430,000. This still leaves two-thirds of this runoff plus all the inflow into the State for on-site and flow uses.

There are many varied and oftentimes conflicting demands for this excellent water supply. The hydropower potential has been estimated as 40 percent of the Nation's total (Senate Select Committee on National Water Resources, Committee Print No. 6, January 1960, p. 368). This cheap power supply has resulted in a per capita electrical consumption in our State that is $2\frac{1}{2}$ times the national average. We also have over a million acres under irrigation with an additional 2 million irrigable acres awaiting development.

Our industry uses 1.2 billion gallons daily, half of it for pulp and paper plants. The huge wildlife population requires a well managed habitat dependent on an abundant water supply. Our half million sportsmen spend approximately \$84 million per year in pursuit of their favorite game animals, birds, and fish. Water-based recreation is developing rapidly on our large natural and artificial lakes, which are also a significant factor in the growth of tourism, now the fourth largest industry in Washington.

Our great river system is used extensively for navigation and fish migration as well. The main stem of the Columbia River is also used for cooling the nuclear reactors at the Hanford plutonium plant, for many years a central feature of our defense system and now the site of construction for the world's largest power reactor.

This brief sketch gives some idea of the immense size of our water supply, the multiplicity of demands on it, and the essential role it plays in our economy. We must develop this huge resource not only as a subsidiary feature of other activities but also as an exportable raw material itself. The following illustration will clarify this point.

With such a tremendous supply it is quite conceivable to export water from Washington to the arid South, even as far as the Mexican border some 1,200 airline miles away, mostly by existing natural watercourses. Suppose we exported 10 million acre-feet per year of the spring runoff, or 9 billion gallons daily on the average. This is less than one-seventh of the runoff originating in Washington. If this amount of water were diverted at the 2,000-foot level, the loss in potential power generation would be about \$74 million per year based on a 4 mill per kilowatt-hour at-site power value. But the five arid Southwest States (Utah, Nevada, Arizona, New Mexico, and Texas) would each receive 2 million acre-feet of water per year. The value of this water, based on \$65 per acre-foot or 20 cents per thousand gallons, which is cheap for industry, recreation, or domestic use, would be \$650 million per year. This is nearly 9 times the value of the potential power loss.

Such a scheme is not as farfetched as it might first appear. A yearly return of \$650 million would amortize this scheme, pay the pumping costs to lift the water to the highlands, and pay for the lost power generation as well. There is no single engineering factor preventing such a large development. Indeed the U.S.S.R. is planning schemes on the Ob and Yenisei Rivers more than 10 times this size (Ravelle, Scientific American, September 1963, p. 106).

The question is "How soon will a north-south diversion be necessary?" The Governor of Arizona reported to the Senate select committee in 1959, for example, a need for 3.5 million additional acre-feet of water per year by 1980, more than a 50-percent increase over the total present demand of the State and more than the scheme described earlier would provide.

Such a scheme raises many general issues and technical points that must be investigated by research teams representing many disciplines. For example:

(1) How much water can the areas of water surplus export to their advantage and what local problems will diversion create? This question must be treated from a socio-political-legal viewpoint as well as from the economic and technical standpoint.

(2) Will the use pattern alter if large quantities of water are made available to the arid areas and what new demands will accompany this change in use?

(3) What population shifts follow changes in water availability?

(4) What are the institutional requirements, particularly legal and political, of such schemes?

There are, in addition, some technical aspects to be investigated such as economical methods of storing water, the physical and ecological dynamics of huge reservoirs, the best method of conveying water very long distances, the reduction of evaporation and seepage losses, and the design of extremely large pumping plants.

This example is only one of several imaginative schemes to rectify the present extremely uneven distribution of water. Research on a variety of ideas must be started, if we are to prevent the water deficit in the arid areas from increasing. We must train young men and women with the vision and skill to develop new concepts and new approaches. We particularly need new methodology for investigating water development, probably including the use of modern branches of higher mathematics and large, high-speed computers.

Compared to the magnitude of our present \$10 billion annual capital expenditure on water and the benefit to the Nation from the type of scheme just described, the \$20 million annual budget in bill S. 2 is small indeed. Certainly, the return to the Nation could be expected to far exceed this investment in research and training.

Finally let me make some comparisons between the size of the budget we might expect, if this legislation passes, and the present budget at my home institution.

Section 100(a) of the bill provides a maximum of \$100,000 per year without requiring specification of the projects. This money would probably be used for the administration of the center including the salaries of the director and his assistants, auxiliary services such as a library on water resources, and for projects not eligible under the matching provision. This is a modest figure, even for a small university. In fact, it is only one-third of the present annual budget I am currently supervising in our hydraulic research laboratory. We might also expect an additional \$100,000 from each of sections 100(b) and 200 bringing the estimated total Federal support on our campus to \$300,000 per year. This is less than one-third of the water research funds that we now spend annually. It would, however, raise the present Federal support for the water research program on our

campus from the present very small 8.5 percent to a more realistic 28 percent.

In summary, this bill provides for much needed research on a modest scale at institutions that are in a unique position to make a twofold contribution in research and education. We at Washington State University feel that this is a sound approach to the protection and development of our great water resource.

Now, with regard to possible duplication of research effort, this problem is always one of proper concern to research workers as well as to administrators and legislators. Admittedly, duplication may exist in classified research programs, particularly in the glamorous fields. In natural resources, however, especially in the more mundane topics such as water, this is extremely unlikely.

There are in fact four mechanisms to prevent significant duplication in the proposed S. 2 program. First, university scholars working in the unclassified areas are extremely reluctant to carry on a research project that has any appearance of duplication. Faculty members are encouraged, perhaps pressured to publish their findings in reputable journals. Publishing results that have appeared elsewhere however is extremely damaging to one's reputation. A thorough acquaintance with prior work is the sine qua non of any reputable research effort.

Secondly, in addition to publications there are many conferences on water resources to keep one abreast of recent findings. For example, it was possible for me to attend three such conferences this summer at Las Cruces, Denver, and Fort Collins. We at Washington State University are holding, jointly with the American Geophysical Union, another water conference at the end of October for those in this field in the Pacific Northwest. Such conferences make it possible for everyone to take advantage of the work of others and to avoid accidental duplication.

Thirdly, as I understand the workings of this proposed program as explained in the earlier testimony by the Secretary of the Interior, the actual individual projects would be reviewed by the Department of the Interior and its consultants before authorization. If this is done as it is now done by the National Science Foundation, for example, duplication is quite unlikely.

The National Science Foundation has all proposals carefully reviewed and evaluated and at least in those areas with which I am familiar, there is no evidence of duplication. Moreover, the national science program is many times larger than the proposed S. 2 program, so the latter should be much easier to administrate and check.

Fourthly, and finally, bill S. 2 speaks specifically to this point emphasizing under section 300 that this new program "will supplement and not duplicate established water research programs."

Thank you, Mr. Chairman.

Mr. JOHNSON. Thank you, Mr. Tinney, for a very fine statement.

There is one matter we would like to clear up, and that is the grants from the National Science Foundation to your university. Is that a 3-year grant or a 1-year grant? The figures that were quoted this morning?

Dr. TINNEY. As of last year we have a \$16,000 grant for that year. I think actually it was a 3-year grant, but it was \$16,000 per year, as I recall.

Mr. JOHNSON. Most of the grants are 3-year grants, I presume?

Dr. TINNEY. Two or three years; yes.

Mr. JOHNSON. Are there any questions from Congressman Roberts of Texas?

Mr. ROBERTS. Thank you, Mr. Chairman.

Doctor, how is the National Science Foundation advised of the research projects? I should think it would be impossible for them to have a record of all the research. Certainly they would have no record of the research done under this type operation, would they?

Dr. TINNEY. No, sir. So far as I know the check on this point is made by the researchers themselves. The proposals are sent out to a number of reviewers, and I have done this several times myself, and it is up to the competent people in that field to check to see if this is done. If it is sent out to four or five reviewers who are experts in this field, there is not very much difficulty in determining whether or not this work is new or old information, because we are in a sense on top of the recent findings by the method of publication, by conferences that I have mentioned. So this difficulty isn't nearly as acute as it might seem, to those in the field. We are particularly conscious of this. We want to avoid this with all the deliberation we can, because it is extremely damaging. To work on a project that has already been done and publish it would make one a laughing stock in the profession. So we go to extreme pains to prevent just this.

Mr. ROBERTS. Under this program—let's say you had to go to three meetings of this group on water research. Could any of the Federal funds be used for such travel as you would do, to go give a paper to that meeting?

Dr. TINNEY. I can't recall the language of the bill precisely on this point, but I would think so. For example, I went to one this summer on the National Science Foundation and I went to three on our own budget.

Mr. ROBERTS. You say you would or would not think so?

Dr. TINNEY. I would think there would be provision for travel.

Mr. ROBERTS. Thank you.

I have no further questions, Mr. Chairman.

Mr. JOHNSON. The gentleman from Washington, Mr. Westland.

Mr. WESTLAND. I certainly want to welcome Mr. Tinney here and congratulate him on an excellent statement. I am not going to get into that part about shipping water down to California or Arizona or something, Doctor. It would be all right after we have used all we need in the State of Washington. As I said earlier in this committee session I believe, the water resources of the State of Washington are probably its most valuable asset and I become more inclined to that view the longer I see these arguments among various States, including the State of the gentleman on my left, over fresh water.

Doctor, I wish you would tell us a little bit more about this water research center. Are you just in the process of getting this set up at Washington State University now?

Dr. TINNEY. Yes, sir.

Mr. WESTLAND. How long has it been in organization?

Dr. TINNEY. It is a very new organization. It is one we have contemplated for 7 years that I know of, and have discussed it at great length.

In April of this year we formed this committee, an administrative committee, consisting of all people concerned, all deans and administrators on the campus concerned with water, and a technical committee—a working committee if you will—to coordinate all our activities in water, because we have a large program in water research on our campus, primarily because we have such a big water asset. To quote directly from our brochure:

Several departments at Washington State University have been deeply involved in teaching and research concerning segments of the water resources for many years. To serve society better, a water research center has been established. The center encourages interdisciplinary cooperation, expanded research, and extended graduate training.

Mr. WESTLAND. Now, Doctor, is the same thing being done at the University of Washington?

Dr. TINNEY. No, sir.

Mr. WESTLAND. I have certainly gotten the impression from Dr. Thieme that the University of Washington is very actively in this water research program. However, they say they have not set up a water research center.

Dr. TINNEY. Not as such, to the best of my knowledge; no, sir.

Mr. WESTLAND. I don't want to get into the debate on this matter between Washington State and the University of Washington, but would the Washington State program be a greater water research program than that of the University of Washington?

Dr. TINNEY. If we are designated as the center under S. 2, and if S. 2—

Mr. WESTLAND. No, as you are operating now. You are spending approximately \$1 million a year now, you say. Do you have any idea what the University of Washington is spending in that area?

Dr. TINNEY. It depends on what one includes. They have a tremendous oceanography program, a big fisheries program, atmospherics—

Mr. WESTLAND. Let's stick to fresh water.

Dr. TINNEY. I don't think that program is as big as ours; no, sir.

Mr. WESTLAND. They have indicated the idea of a regional setup, Doctor, and I have a copy of a letter here that was sent to Montana, Oregon State, Washington State, British Columbia, Idaho, Oregon, and Washington. The idea of a regional coordination of research efforts, what would you think about that?

Dr. TINNEY. No, sir; I don't think I would agree, because the problems of the State of Washington are not the same as the problems of the State of Idaho, or the State of Oregon. Our adjoining States have different problems, different political emphases, different treaty problems, different types of economy. The pressures for the water are different. This dictates the matter of the need for water and I think we would have two quite different problems. I wouldn't expect a regional problem to apply to it with the same enthusiasm as with other States. This is the type of thing we need. It uses our local expertise and to go to an adjoining State to ask them to look at our problems, I don't think this is the way to solve the problem. I think it is very much parallel to the agricultural stations as has been said this morning.

Mr. WESTLAND. Do you think that more or less of a shotgun approach to all 50 States, setting up these water research centers at some

university in each of the 50 States is a better program than more of a concentration in certain specific areas?

Dr. TINNEY. Very definitely. From the work that I have seen going on in the water resources, this is very much the case. We do need centers like this in each and every State. I know, despite the fact we have a surplus of water, we feel strongly the need for a center. New Mexico has a shortage. They want one. It is different between States, and I don't agree with that term, that it is a shotgun approach. I think it is a very valid, sound approach to solving a variety of local problems with local people.

Mr. WESTLAND. Well, do you think the University of Washington, which you say is probably comparable to your program, certainly in manpower, it probably exceeds your program, I don't know about the financial area, but don't you think that the University of Washington and Washington State University would be studying hydrology problems in the State of Washington?

Dr. TINNEY. Yes, sir.

Mr. WESTLAND. Would it not be better to have those two working together than to have one on one side of the mountains and one on the other side of the mountains?

Dr. TINNEY. I wholeheartedly agree with this, and this is the direction in which I would want to go.

This is primarily toward land-grant institutions but it doesn't exclude the others and if they can make a stronger argument for the center to be there, then all power to them.

I should certainly think that neither one of us would be excluded because the provision of the bill is for a center at some geographic location, but the bulk of the money is under matching funds to any institute, and not necessarily to the center, so that we won't—

Mr. WESTLAND. The chairman of the committee advises me the State legislature would designate the area. This would be rather a difficult problem for the legislature to designate either the University of Washington or Washington State University.

Dr. TINNEY. I think, sir, you would know the answer to that better than I.

Mr. WESTLAND. The University of Washington seems to obtain fairly substantial funds from the National Science Foundation in fiscal year 1963, but I don't find anything for Washington State University. Can you tell me why?

Dr. TINNEY. One of the reasons is that we have a division of industrial research which gets a substantial grant from the State legislature and so the pressure is not as great to go to the National Science Foundation. That is one point. Perhaps a bigger point is that they have a bigger staff and are submitting more proposals. You can't get all the proposals you ask for from the National Science Foundation and they are submitting more than we are.

Mr. WESTLAND. Have you submitted proposals to the National Science Foundation?

Dr. TINNEY. Yes. I have had two myself.

Mr. WESTLAND. That have been turned down?

Dr. TINNEY. I haven't had any turned down, but others on our staff certainly have.

Mr. WESTLAND. Do you believe the Federal Government should contribute a greater percentage to your present program of approximately \$1 million a year, or do you believe there should be an additional fund? I mean, if S. 2 were to be passed, would Federal funds then take the place of State funds?

Dr. TINNEY. No, sir. In fact, what must come about by the provisions of the bill is more State funds, because we are seeking matching funds. We are seeking to increase both the State appropriation as well as from the Federal Government. As a matter of fact, if the trend goes as it has been going, we will again get considerably more from the State than from the Federal Government. The Federal Government money would be more of a catalyst than an outright grant.

Mr. WESTLAND. There are programs available at the Federal level today which apparently Washington State is not utilizing, and I mean the National Science Foundation.

Dr. TINNEY. There are programs, certainly, and the NSF is one. But NSF and all the other Government agencies have specific programs with specific aims. This one has a much broader format and covers a broader spectrum that cannot be covered under the mandate to the other agencies. The National Science Foundation, for example, can support only basic research. Much of what is going on in water is an applied program. If you go to the Agricultural Research Service, it must be agriculture oriented. This money under this bill has a broader spectrum which we feel is not covered by any other agency. So it isn't a matter of not utilizing, it is a matter of a different kind of money.

Mr. WESTLAND. You could use State funds on applied research, you could use National Science Foundation funds for basic research, couldn't you?

Dr. TINNEY. We could.

Mr. WESTLAND. Apparently you have a million dollar program which only includes \$16,000. Dr. Robertson's program, from the National Science Foundation. Yet we have seen some very substantial contributions from the National Science Foundation; \$500,000 to Harvard.

Dr. TINNEY. What in, sir?

Mr. WESTLAND. Atmospheric.

Here is \$250,000. The University of Chicago has a half million dollars, meteorological experimental hydrodynamics.

Dr. TINNEY. You have mentioned two which come from the weather modification. We don't have a department of atmospheric sciences on our campus, and the weather modification program of the NSF is quite different. It is both basic and applied, whereas the rest of the NSF program is basic. This is something for which we are not eligible.

Mr. WESTLAND. Here is another one at the University of Chicago; \$400,000 for physical effects of silver iodide seeding in cumulus clouds.

Dr. TINNEY. The same thing, sir.

Mr. WESTLAND. Cloud and precipitation processes pertaining to rain, \$279,000 to Penn State, which I mentioned earlier. You cannot participate in those programs?

Dr. TINNEY. No, sir. That is the University of Washington. They have the atmospheric sciences and I presume they are doing it.

Mr. WESTLAND. They have one energy transfer near the earth's surface for \$140,000. Nevertheless, funds are available to Washington State from the National Science Foundation now, and they are almost unlimited, aren't they?

Dr. TINNEY. No, sir. The competition for the NSF money is extremely difficult.

Mr. WESTLAND. They put out about \$5 million this year.

Dr. TINNEY. Still that is a lot of institutions. I think we are getting about our fair share in the areas where we have departments. I don't feel we are getting less. One year would be more than another. I think we are taking advantage of the NSF program fairly well. I myself have gotten two grants from them totaling \$63,000.

Mr. WESTLAND. Did you participate in this U.S. Geological Survey, this water resources investigation in Washington?

Dr. TINNEY. No, sir.

Mr. WESTLAND. Did Washington State University participate in that?

Dr. TINNEY. No.

Mr. WESTLAND. They spent \$870,000 on the State of Washington, of which about \$300,000 came from the State and \$400,000 from the Geological Survey, and \$156,000 in transfers from other Federal agencies. They've got \$10 million scheduled for surveys for fiscal year 1964. Now, you don't participate in any of those?

Dr. TINNEY. No, sir. I think you are referring to what might be called an in-house program, of the Geological Survey.

Has this been allocated out to any of the universities, at all?

Mr. WESTLAND. I don't know.

Dr. TINNEY. I don't think so.

Mr. WESTLAND. They got \$269,000 from the State of Washington and I didn't know how that money was spent, but there is a lot of it that went over in your part of the country. You did not participate in that?

Dr. TINNEY. No, sir.

Mr. WESTLAND. \$870,000 was spent there.

I think that is all, Mr. Chairman.

Mr. JOHNSON. The gentleman from Idaho, Mr. White.

Mr. WHITE. Thank you, Mr. Chairman.

I am a little bit like the gentleman from Washington. I would like to ask a question with reference to a phrase included in your statement here, "the mean daily runoff is 68 billion gallons." Does that include the flow of the Columbia River and the Snake River?

Dr. TINNEY. This is a statement taken from the Geological Survey paper of 1963 in which they state specifically the runoff originating in the State of Washington as 68 billion gallons.

Mr. WHITE. That does not include the flow of the Columbia River or the Snake River?

Mr. TINNEY. No, sir.

Mr. WHITE. That being the case, I will ask no further questions.

Mr. JOHNSONS. The gentleman from Hawaii, Mr. Gill.

Mr. GILL. Mr. Tinney, I gather from your statement that you believe that your university or any university designated as the agency within the State to handle these certain funds would receive money

from all three sources set forth in the bill under section 100 (a), (b), and section 200; is that correct?

Dr. TINNEY. We would certainly apply for it, sir.

Mr. GILL. You would consider then the first money—the basic \$5 million divided up \$100,000 per university—as purely overhead and staff money, and the research money would then be gotten from the matching funds or from the grants?

Dr. TINNEY. No, sir. Quite a bit under (a) would also go into acute problems in our State. That is, it would be research funds.

Mr. GILL. In other words, you would have research being carried on out of the first \$100,000?

Dr. TINNEY. That is correct.

Mr. GILL. It would not be purely for staffing. Do you have any idea of how large a program Washington State might reasonably be expected to come up with?

Dr. TINNEY. I say bring the estimated total S. 2 support on our campus to \$300,000 per year. This was a problem, trying to give some idea of the type of thing we are thinking about.

Mr. GILL. That is where I got my idea that you were going to tap all three sources. That is what you had in mind?

Dr. TINNEY. That is correct.

Mr. GILL. What could you do for \$300,000?

Dr. TINNEY. One of the things is to look at this problem of what is the size of our water resources. We don't know, for example, whether or not we have enough to export. We really cannot satisfactorily answer that question. Our first problem would be to look at an inventory of surplus water. Then we would see, within the State, how should this be distributed. Looking toward the year 2000, say. What general plan would be best for our State?

From that we might derive, for example, that we could export water. This was just an indication of our use, but this is one type of far-reaching thing that we think we must look at. That is why I used that example. There are also a host of other problems as listed this morning, of pollution, particularly with respect to irrigation, on our water, and the behavior of reservoirs. We still do not know the interrelationships between the biological and physical effects of reservoirs and yet we have a great concentration of huge reservoirs. We must get into a reservoir program in our State. We don't know where to draw the water from for cooling. How the temperature affects fish. We don't know the effect of reservoirs on recreation uses. We see a lot of water-based recreation, but we still haven't a good evaluation on this, and on the future. There are questions like this that we must answer with regard to our tremendous water resources.

Mr. GILL. Would questions of this sort be better answered by the State or by some regional cooperation of universities in the Northwest area?

Dr. TINNEY. We would expect it to be answered by cooperation between these centers that are proposed.

Mr. GILL. In other words, you would contemplate carrying on joint research with, say, the Oregon institutions and certain Montana institutions?

Dr. TINNEY. Certainly. I would think this would very soon go up to cooperative programs in which we are working on different facets

of the same programs as they affect different States. I think this would be a logical outcome. As we do it in agriculture, now.

Mr. GILL. Who would determine the degree of cooperation? Would this be purely worked out by the institutions involved, or would the Secretary of the Interior have some proper role to play here?

Dr. TINNEY. I think he has a proper role to play, but the initiative for doing this should come from the centers. We are the ones with the problems and we have the interest in this. I would think we would ask the Secretary for permission to engage in cooperative research. I think there are a lot of ramifications, here, in how this program could be worked out, that are permitted in the bill.

Mr. GILL. Is it possible that you would have some conflict between the States if you started studying the export of water?

Dr. TINNEY. Certainly. Of course, this is our problem all the time.

Mr. GILL. You could research it but leave the solution to the politicians.

I have no further questions.

Mr. JOHNSON. Dr. Tinney, I would like to ask, would your research center be set up by an act of the legislature?

Dr. TINNEY. No, sir; this is a local organization set up by our board of regents.

Mr. JOHNSON. Did the legislature make a specific appropriation?

Dr. TINNEY. Not yet, sir. We have done it between legislative sessions.

Mr. JOHNSON. When was it created?

Dr. TINNEY. April.

Mr. JOHNSON. April of this year?

Dr. TINNEY. Yes.

Mr. JOHNSON. That is all.

If there are no further questions, we want to thank you, Dr. Tinney, for your statement.

Mr. WHITE. Mr. Chairman, I hope you people in California appreciate having a witness here from the State of Washington.

Mr. JOHNSON. We are looking to the State of Washington for many things, including water.

The next witnesses will be from Michigan State University, Dr. Milton E. Muelder, vice president, and Dr. Laurence L. Quill, director, Institute of Water Research.

STATEMENT OF DR. LAURENCE L. QUILL, DIRECTOR, INSTITUTE OF WATER RESEARCH, MICHIGAN STATE UNIVERSITY

Dr. QUILL. I am Laurence L. Quill, professor of chemistry and director of the Institute of Water Research.

Vice president Muelder at the last minute was unable to come to Washington, so I shall present the material.

Our president, Mr. John Hanna, wishes me to state that he is very much interested in the purpose of this legislation. Governor Romney has also expressed to us in the last few days a keen interest that we must do something about water resources nationally, statewide, and locally.

Michigan State University endorses the establishment of Water Resource Research Centers envisaged in the several bills, S. 2, H.R. 2683,

H.R. 2689, H.R. 4048, H.R. 7234, H.R. 7239, and H.R. 7258. We appreciate the opportunity to convey some of the factors underlying our support.

Mindful of the strategic importance of Michigan with reference to water problems, Michigan State University undertook some years ago a study of its participation and future responsibilities in problems of water researches. This review culminated in the creation by the board of trustees of an Institute of Water Research in December 1961.

Authors of the water resource research proposed legislation have, we believe, successfully combined two important, significant approaches: (1) The advantages contained in the agricultural experiment station model which has been so eminently successful, and (2) the advantages of individual research project arrangements so successfully applied by many Federal agencies as NSF, AEC, and NIH in the post-World War II period. These approaches complement each other.

By utilization of the agricultural experiment station model there is provided continuity of organization, of responsibility, and of programming as well as continuity of support of training and research programs related to water. Under the proposed legislation these efforts can be augmented by other individual research projects. This provision makes it possible to solicit participation of broad faculty resources present in the several academic communities. Also universities with water resource research centers would, if appropriate, be able to engage in additional and unusual research programs which might be urgently required from time to time beyond those pursued on a continuing basis.

As in agriculture, problems in water research involve the coordination of a variety of disciplines. These efforts must be articulated with a variety of nonuniversity jurisdictions and interest groups concerned with water problems such as State conservation departments, industrial groups, health offices, et cetera. Water problems are National, regional, State, and local in character. Institutions such as Michigan State are long accustomed to working effectively and cooperatively in all of these dimensions.

A number of universities have requested Michigan State University to advise on the establishment of water resource institutes. A consensus is fast developing with those with whom we have communicated concerning basic functions, services, and possible contributions of such centers. The institute at Michigan State may be regarded as representative. It serves to identify and report on water studies in progress at the university and elsewhere, to develop plans and programs of interdisciplinary nature relative to water research, to assist in the development of resources to support water researches in established departments, to act whenever expedient as a recipient for funds for water research, to provide a focal coordinating agency to which the academic community and off-campus groups might turn for advice, guidance, and assistance.

The survey made 2 years ago at Michigan State University revealed not only how complex and multidisciplinary the spectrum of water problems is, but also how extensive the potential academic support is at an institution such as Michigan State University. Seventy-three research projects were noted as related to water. Projects involved 80

faculty members, 21 departments, and 8 colleges. They touched upon many of the subjects mentioned in the report of the Federal Council Water Resources Task Group and underlined by Dr. Jerome B. Wiesner as constituting areas in which a creative approach to water research will be increasingly necessary in the years to come. The several key areas already mentioned in previous hearings may be repeated for convenience here:

In the realm of basic research, greater understanding of the nature of water as a substance;

Evaluation, prediction, and modification of the water cycle, including precipitation, evaporation, and ground water flow;

The relationship of water to land management, considering agricultural, irrigation, and flood control practices;

The systematic development and control of water resources, including problems of storage and transport, flood control, power, navigation, urban and industrial use, recreation, and wildlife;

The problem of water quality, considering physical, chemical, and biological wastes and their disposal; and

The reuse of water and separating processes, including saline conversion.

The Michigan State University survey also showed that the university has a strong potential to provide excellent training in such water problems as hydraulics and fluid flow, the design of supply and sewage disposal systems, geophysics, structural geology and hydrology, water resource development and conservation, watershed management, public health sanitation, water and sewage, wildlife management, et cetera. The basis for excellent career opportunities in water management exist if discreet training programs and research experiences could be further developed.

The present institute of water research at the university will continue to serve an important function at the university but it will not be able to bring to fruition the potential of this academic community. Available funds are too limited. Water research has not enjoyed the same support from Federal agencies as have other areas of the physical and biological sciences. We are, therefore, constrained to speak of current potential. Needed is a vigorous program of training of scientists, research, dissemination of information, and interaction with other universities and appropriate research agencies working on problems of water. The heavy demands upon universities to educate an increasing number of students at the undergraduate and graduate level render urgent the allocation of funds specifically to university water resource research centers. Michigan State University, therefore, warmly endorses the purposes of this legislation. Such legislation would not be regarded by Michigan State University as providing funds or as initiating programs which duplicate present operations or efforts, but as providing a resource to realize a potential of the university to make significant contributions to water problems.

Mr. JOHNSON. Thank you, Dr. Quill.

The gentleman from Texas, Mr. Roberts.

Mr. ROBERTS. Thank you, Mr. Chairman.

Mr. Quill, everybody who has testified practically has a new water research institute. Were these all set up in anticipation of approval of this bill?

Dr. QUILL. With respect to ours, I can say, "No." Ours has been underway since 1961, but the planning began back in 1956 or 1957.

The president of the University of West Virginia, who was our provost at that time, initiated this study back at that time and after many conferences of deans, and surveys, it was decided approximately 3 years ago to go ahead with the organization of the center and our board finally approved it in 1961.

Mr. ROBERTS. About the same time this bill was conceived?

Dr. QUILL. About the same time. We did not know anything about this bill coming along at that time. I did not enter the picture until a month after the institute was created, when I was called in by our vice president for research and development and asked if I would take on this responsibility.

Mr. ROBERTS. Mr. Quill, how much agricultural experiment station money is devoted to the study of water, irrigation, et cetera, and how much is available? Do you know, offhand? It is a tremendous sum?

Dr. QUILL. It is a tremendous sum. Offhand, I couldn't say in dollars. I know that we are doing an appreciable amount through many of our agricultural departments.

Mr. ROBERTS. That would involve direct duplication?

Dr. QUILL. I am sorry?

Mr. ROBERTS. Mr. Quill, is actually the purpose of this thing to develop water or develop scientists and develop jobs for researchers?

Dr. QUILL. I think it is a combination.

Mr. ROBERTS. Thank you, sir. I appreciate very much your frank statement.

Dr. QUILL. One thing we speak about very frequently is that a professor who does not create his own kind is not really a professor. By that I mean that people who are only doing research, who are doing scientific work and not training new people may be creating a deficit in our scientific world of the future, and we believe that our research is research and training and much of the work in the agricultural experiment stations can be tied in in that particular respect. We are attempting to prepare some people to fit into our shoes when our day is done.

Mr. ROBERTS. Sort of like a preacher, if he doesn't build a new church he is not much of a preacher.

Dr. QUILL. That's right.

Mr. ROBERTS. That is what I am afraid of.

Thank you.

Mr. JOHNSON. The gentleman from Washington, Mr. Westland.

Mr. WESTLAND. Dr. Quill, it sounds like Michigan State is going into this water research program in a pretty big way. You say these projects involve 80 faculty members, 21 departments, and 8 colleges. I don't want you to break it down, really, but how many full-time people would you say you have in your water research program?

Dr. QUILL. Per se, we have very few. In many of the problems, water enters in in some manner. For example, in horticulture we have had some very fine research going on just recently on the relationship of the water in the atmosphere to the proper growth of tomatoes and strawberries. I would like to cite one project, however, that we included in this survey. This particular project does not mention water. It is called the evaporation of thin metal films. When you see that as a project listed under water the question might come up: Why is that considered a water research problem?

One of the things we do not yet adequately know is how does water actually evaporate, and in our Western States—I say “Our Western States,” because I come from Nevada originally and I am familiar with the problems out there—I served as a water commissioner at one time—when we get into the problems of evaporation and want to put a thin layer of an alcohol or other substance over the water to prevent the rapid evaporation, we still must learn more of the fundamental way, the actual way in which water evaporates. And so we are using this experiment on the evaporation of thin metal films as a way of learning how water evaporates.

Mr. WESTLAND. Well, evaporation of water, being a westerner, you and I know, is a pretty important subject when you get to talking about a reservoir.

Dr. QUILL. That's right, sir.

Mr. WESTLAND. Are you setting up a department at Michigan State on weather research?

Dr. QUILL. It has not been our intention. We want to use our existing departments and existing manpower. We have our hydrology and sanitation in our chemical engineering group. We have some very capable people in our geophysics group, some very capable people in the other departments. We want to utilize the manpower we have and extend, rather than to create, a new empire.

Mr. WESTLAND. You created an institute of water research.

Dr. QUILL. That's right, sir.

Mr. WESTLAND. Is this institute of water research a part of Michigan State?

Dr. QUILL. It is, sir. A coordinating, correlating agency.

Mr. WESTLAND. But it is not a department?

Dr. QUILL. It is not a department. As director, I am working with the people in all of the different departments attempting to coordinate and correlate that work.

Mr. WESTLAND. Does this institute of water research have a budget?

Dr. QUILL. A very small, nominal budget for operating. We are getting some funds from other sources. As, for example we had one small grant last year from the National Science Foundation which came into the institute. We then requested people doing water research to make requests for studies. We allotted this money to them, and then it was operated under their respective departments.

Mr. WESTLAND. I saw where Michigan State had gotten approximately—

Dr. QUILL. There is one project in our department of civil engineering on the study of frozen soils.

Mr. WESTLAND. \$42,000.

Dr. QUILL. That is a 3-year project. This is a project of importance to the highways, too.

Mr. WESTLAND. Have you applied to the National Science Foundation for any other research project?

Dr. QUILL. We have in some of the respective departments; yes, sir.

Mr. WESTLAND. Have any of the others been granted, do you know, or are they under consideration?

Dr. QUILL. Some are under consideration at the present time. I couldn't answer positively.

Mr. WESTLAND. Dr. Quill, this sounds like a rather recent development at Michigan State.

Dr. QUILL. On a correlating basis; yes, sir. There has been water research in hydrology and the geophysics have been going on for several years, but coordination is new.

Mr. WESTLAND. Do you know what the University of Michigan is doing in this field?

Dr. QUILL. They have a number of projects, a number of operations. They have been doing an extensive amount of work on the problem of pollution. We have not tried to work in that aspect of it because we do not think there should be duplication.

They have received a good grant for some work in the study of the Great Lakes region.

The fisheries and wildlife people at Michigan State are working with the University of Michigan people on that project to a limited extent.

Mr. WESTLAND. We have had testimony from presidents of other universities and other members of university staffs who are involved in this research business indicating that they are contributing pretty substantial sums of money in the water research field.

Dr. QUILL. Yes, sir.

Mr. WESTLAND. I think the State of Washington, on a per capita basis, is doing more than anybody I have heard of yet. Frankly, that is the way I like it.

Have you any idea what Michigan is doing in the way of State funds in this water research field?

Dr. QUILL. I don't know how to hazard a guess on that because we have our water resources commission which has moneys for it.

Mr. WESTLAND. Doctor, let me put it this way: Could you supply some figures for this committee as to what the State of Michigan is providing in the way of funds for water research?

Dr. QUILL. Yes, sir.

Mr. WESTLAND. I would like to know that. Break it down between Michigan State and the University of Michigan, perhaps that would be interesting, too.

Dr. QUILL. All right.

Mr. JOHNSON. If there is no objection those figures will be made part of the record.

Congressman White, have you questions?

Mr. WHITE. Has not Australia and New Zealand been doing research on evaporation from reservoirs for many years?

Dr. QUILL. There has been some research there as I understand it.

Mr. WHITE. Didn't they do some of the first work on film layers over reservoirs?

Dr. QUILL. I believe they did.

Mr. WHITE. I wonder if you were apprised of what they have been doing?

Dr. QUILL. No, I have not worked too much in that particular area myself.

Mr. WHITE. I have no further questions, Mr. Chairman.

Mr. JOHNSON. If there are no further questions—

Mr. McFARLAND. There has been considerable discussion relating to NSF grants. At our previous hearings it was suggested that perhaps the way to handle this would be to give NSF the authority to administer this program, or, in other words, to expand their au-

thority to get into applied research in addition to their basic research.

Have you any comment on that suggestion?

Dr. QUILL. Personally I don't think it would make too much difference as long as those of us who are trying to get some of the fundamental facts, and I would like to return to what Dr. Aldrich mentioned several times—one of the functions of the universities is to get fundamental data.

If we had a mechanism where we could go after those particular problems, applied research will usually follow if you have the fundamentals.

I have kind of dodged it in a way.

Mr. McFARLAND. That is all.

Mr. JOHNSON. We thank you, Dr. Quill.

Our next witness will be Dr. Allen F. Agnew, of Indiana University.

Dr. Agnew, how do you wish to present this? Do you want to read it into the record or will you summarize it?

STATEMENT OF DR. ALLEN F. AGNEW, DIRECTOR OF WATER RESOURCES RESEARCH DIVISION, UNIVERSITY OF INDIANA

Dr. AGNEW. With your permission I would like the total statement introduced into the record but I would like to comment on parts of it and make some other remarks.

Mr. JOHNSON. Your statement will be made part of the record at this point. You may proceed.

(Dr. Agnew's statement follows:)

THE NEED FOR INCREASED RESEARCH IN WATER

In the United States during the next 50 years, although the country as a whole will not be short of water, at least for years of average precipitation, it is well known that regional shortages will undoubtedly arise. The principal problems in the areas of shortage will be those of reuse and of discovering other methods of reducing the consumptive use of water.

The engineering facilities needed to receive, to transport, and to distribute this water will be expensive, because of the tremendous volumes involved. Opportunities are great, however, for increasing the quantity, and for improving the quality and the timing of delivery of this water, if we can achieve a better understanding of natural factors such as the interactions between vegetation, soils, and water, and thus learn how to influence those interactions. Even slight improvements in this regard can lead to large savings in the cost of handling and using the resource.

The present rate of expenditures for water facilities in the United States, both Federal and non-Federal, is \$10,000 million per year. However, the amount expended for Federal research and training in water matters was only \$66.8 million in fiscal year 1963, or two-thirds of 1 percent ("Federal Water Resources Research," committee print, Committee on Interior and Insular Affairs, U.S. Senate, 88th Cong., 1st sess., p. 171). This figure is in bold contrast to the 2 percent of the gross national product that is spent for all Federal research and development efforts. It fares even worse by comparison with the 4 percent of net sales, which represents the amount that manufacturing companies expended on research and development in 1959.

Obviously, the support for research in water, this resource that is so important to the economic development and growth of the United States, is grossly inadequate. The water research provisions of Senate bill S. 2 and companion measures therefore appear as the dawning of a new day as far as the water problems of our Nation are concerned.

THE NEED FOR SPECIALIZED INSTRUCTION

The Nation needs trained hydrologists today, whereas just a few years ago the category of hydrology was considered as only a segment of several disciplines such as civil engineering and geology. In addition, many who have been required to make decisions in areas such as water management and multiple-purpose planning have obtained their training mainly via the difficult road of experience rather than with formal education in these fields as a base.

The committee print mentioned above cited several imbalances in the present water resources research program, and I wish to emphasize the following two:

(1) The very modest support of education in the field of hydrology, in the light of the indicated inadequacy in hydrologic education in the universities, and

(2) The need for emphasis on, and the balance between water resources evaluation and water resources management, with particular attention to forecasting and hydroeconomic research.

In a statement presented on February 26, 1963, to the Committee on Interior and Insular Affairs of the U.S. Senate through the Honorable George McGovern, of South Dakota, I attempted to stress the great need for the specialized education and training required for research personnel in the field of water resources, as this basic factor is a major bottleneck in our Nation's anticipated expansion of effort in the water resources field.

HOW SPECIALIZED INSTRUCTION AND TRAINING CAN BE OBTAINED

This need for specialized instruction has been recognized by many universities through the recent establishment of new curriculums in hydrology, or by the modification of existing ones. Most of these universities have developed programs similar to that given by the Federal Council for Science and Technology in its report, "Scientific Hydrology" (June 1962), wherein hydrology is defined (p. 2) as "the science that treats of the waters of the earth, their occurrence, circulation, and distribution, their chemical and physical properties, and their relation to living things." Thus the student of hydrology is well versed in geology and related earth sciences, in physics, chemistry, biology, and of course, mathematics and the engineering disciplines.

Others, because of the breadth of the problems in water supply and management, are expanding the field of training to include work in the economics of water supply, and in water law. For example, the interdisciplinary graduate program at Cornell University and the recently established graduate program in hydrogeology at Indiana University are following this route.

Such training will surely "embrace the full life history of water on the earth," as was stated so aptly in the report just mentioned, and personnel with this training will be equipped to enter into research on the many-faceted water problem that confronts our Nation today.

SUPPORT OF SPECIALIZED INSTRUCTION AND RESEARCH

Research needs in the future can be met with personnel trained in the aforementioned manner, provided that adequate support for this education and training is forthcoming. The committee print cited above (op. cit., p. 189) mentioned the need to strengthen support of graduate training and research in water resources by "developing university research centers or groups in different regions of the country," and suggested that funds be provided to them to strengthen their capabilities. The committee print also noted that "it will be necessary for the Federal agencies * * * to give grants and make contracts for the support of extramural research projects in recognition of the broad range of intellectual resources at the universities and the contribution of such research to the training of new scientists."

Senate bill S. 2 therefore is an excellent vehicle for implementing some of the recommendations of the Federal Council for Science and Technology, and I am heartily in support of its principles. In recognition of the existing situation in water resources research in the United States, I would suggest the following modification in order to enable S. 2 to fulfill its purpose most effectively. It should emphasize the necessity, and provide for educating and training the personnel required for research in fields related to water, as the important initial phase of the long-range research program, rather than as just one of many phases.

EXPANSION OF BASIC DATA-COLLECTING PROGRAM

There is a great need for a vastly expanded program of collecting basic data and for performing basic research in water, by the several Federal agencies. The committee print stated (op. cit., p. 194) that "it must be kept in mind that Government agencies have an indispensable place in basic research on water. There is need to strengthen their in-house basic research to upgrade the quality of their scientific efforts and to provide the requisite competence to guide their overall research programs. Accordingly, funds should be provided to strengthen the in-house research competence of the Federal agencies, particularly their basic research programs."

With reference to Senate bill S. 2, the foregoing statement would be more adequately reflected if section 301 of title II were reworded in a more positive manner, to emphasize the present value and the future need for expansion of the basic data collection and research activities by Federal agencies such as the U.S. Geological Survey.

CONCLUDING REMARKS

Finally, it must be emphasized that the operation of a water resources research center, such as the one at Indiana University, is interdisciplinary in nature, as it works with many individual departments that are concerned with specific phases of water research. Just as the desire for cooperation and coordination is a basic factor in the establishment of a water resources research center at a university, even more is there the necessity for close liaison between the university centers and the Water Resources Service of the Department of the Interior that would be administering the program as outlined in Senate bill S. 2. And equally necessary must be the close cooperation of the several Federal agencies which themselves conduct research in water matters.

Only with such an outlook of cooperation and mutual participation by all parties involved in the administration and performance of the water resources research program—at the Federal, at the interstate and interuniversity, and at the university levels—will the maximum efficiency be attained and the optimum development of our Nation's water resources be realized.

Dr. AGNEW. Mr. Chairman and members of the committee, I come from a State that is blessed with an average of 45 inches of rainfall a year. We call it a humid State, and we have just passed through a period of more than 30 days without rainfall in the central and southern part of Indiana.

This fact points up the importance of the pattern of distribution of rainfall, both in aerial extent as well as in time.

The rain of yesterday broke the dry spell. Some might interpret this as an omen related to hearings on the legislation we are speaking about today.

Water problems are local. They are also regional. There is a great need as has been expressed earlier today, for coordination of effort at all levels of research and administration.

Water problems are hydrologic and also geologic, chemical, biological, and legal. The economics of water supply focus on the need for reasoned decisions regarding water management in the administration of the water laws in the individual States.

Referring to my prepared statement, in the United States during the next 50 years, although the country as a whole will not be short of water, at least for years of average precipitation, it is well known that regional shortages undoubtedly will arise. The principal problems in the areas of shortage will be those of reuse and of discovering other methods of reducing the consumptive use of water.

The amounts spent for Federal research in training for water matters was only two-thirds of 1 percent of the present rate of expenditures for water facilities in the United States. This is total Federal and non-Federal. This information is taken from a committee

print with which you are familiar, Federal Water Resources Research, committee print, 88th Congress, 1st session of the Senate. This figure is in bold contrast to the 2 percent of the gross national product spent for all Federal research and development efforts. It fares even worse by comparison with the 4 percent of net sales which represents the amount that manufacturing companies expended on research and development in 1959.

Obviously, the support for research in water, the resource so important to the growth of the United States, is grossly inadequate. The water research provisions of Senate bill S. 2 and companion measures therefore appear as the dawning of a new day as far as the water problems of our Nation are concerned.

The Nation needs trained hydrologists today, whereas just a few years ago the category of hydrology was considered as only a segment of several disciplines such as civil engineering and geology. In addition, many who have been required to make decisions in areas such as water management and multiple-purpose planning have obtained their training mainly via the difficult road of experience rather than with formal education in these fields as a base.

The committee print mentioned above cited several imbalances in the present water resources research program, and I wish to emphasize the following two:

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(2) The need for emphasis on, and the balance between water resources evaluation and water resources management, with particular attention to forecasting and hydroeconomic research.

This need for specialized instruction has been recognized by many universities through the recent establishment of new curriculums in hydrology, or by the modification of existing ones. Most of these universities have developed programs similar to that given by the Federal Council for Science and Technology in its report, "Scientific Hydrology" (June 1962), wherein hydrology is defined as "the science that treats of the waters of the earth, their occurrence, circulation, and distribution, their chemical and physical properties, and their relation to living things." Thus the student of hydrology is well versed in geology and related earth sciences, in physics, chemistry, biology, and of course, mathematics and the engineering disciplines.

Others, because of the breadth of the problem in water supply and management, are expanding the field of training to include work in the economics of water supply, and in water law. For example, the interdisciplinary graduate program at Cornell University and the recently established graduate program in hydrogeology at Indiana University are following this route.

I have supplied to you, Mr. Chairman, and to members of the committee, a statement describing the water resources research center at Indiana University.

This is for your information and inclusion in the record if you think it desirable.

This bears on some questions asked of Dr. Quill.

Mr. JOHNSON. If there is no objection we shall make this part of the record at this point.

(The information referred to follows:)

[From News Bureau, Indiana University, Bloomington, Ind., June 18, 1963]

BLOOMINGTON, IND.—A water resources research center, to integrate the diverse water research activities of Indiana University and to coordinate them with water programs of State and Federal agencies, other academic institutions, and private organizations, has been established as an interdisciplinary component of Indiana University, President Elvis J. Stahr, Jr., announced here today.

The new integration of water research activities as approached by numerous disciplines, departments, and individual researchers on the Indiana University campuses is expected to bring a broad perspective to the total effort to solve the increasingly complex problems of water resources at all levels of concern.

"Emphasis will be placed on water problems peculiar to the Midwest, a humid rather than an arid region," President Stahr explained.

"This populous and industrialized region of high rainfall encounters water resource problems through the need for clear understanding and efficient management of the hydrologic cycle and to deal effectively with stream pollution, flood control, drainage, multipurpose storage, recharge of aquifers, soil conservation measures, and regulation to assure optimum use of the available water supply for navigation, recreation, farming, consumption, industrial processes, and power generation," he explained.

The broad perspective to be gained from the water resources research center and its coordinating activity will help identify and define those areas in which current research on the part of many organizations is deficient and to stimulate and initiate new research programs in these critical areas, the Indiana University president stated.

The water resources research center will bring together the following areas within the university of outstanding competency already committed to a research effort concerning or related to water problems:

(1) The long-established graduate programs in geophysics, geochemistry, geomorphology, glacial geology, and sedimentary petrology and the newly established doctoral program in hydrogeology in the department of geology;

(2) The Indiana Geology Survey, located on the Indiana University campus, with abundant information gained from its basic geological investigations in reservoir construction, flood control, water supply, and water problems associated with recreation, highway construction, drainage basin water control planning, and water-related aspects of planning and zoning;

(3) The aquatic research unit, a cooperative activity of the department of zoology and the Indiana Department of Conservation, with a year-round laboratory research program and a program of field investigations related to Indiana lakes and streams;

(4) A new Indiana University biological research station under construction at Crooked Lake financed, in part, with funds provided by the department of conservation to improve and expand the research in those aspects of water problems related to the existing programs in botany, zoology, ecology, and other aquatic sciences;

(5) The research facilities of the department of bacteriology at Bloomington, and at Indianapolis, the microbiology department of the school of medicine, and the department of public health associated with both the school of medicine and the State department of public health;

(6) The facilities for investigation of the chemical quality of water in the departments of zoology, chemistry, and geology;

(7) The recreation department of the school of health, physical education, and recreation and its interest in the human uses of water including management of water for recreational purposes;

(8) The aerospace research applications center in the Indiana University foundation with its programs of regional economic studies, electronic data processing for information retrieval, and technical engineering assistance in aerospace research applications all of which will complement applied research efforts in the manifold public and private problems of water resource development;

(9) The institute for applied urban economics in the school of business and the community planning division of the department of government with their interdisciplinary research organizations brought to focus upon the urban complex as a single unit in which water problems are a basic concern;

(10) The school of law and its research into the legal and political aspects of water supply, waste disposal, stream pollution, and the protection of sub-surface water;

(11) The extensive talents of the staff of the school of business experienced in research into the economics of inland river canalization and navigation relating to economic policy for urban, State, and National waterway resource development; the development of water for use and distribution by public utilities including power generation use and cost analysis for public investment decisions in recreational facilities as well as international economic development studies including water resource development as part of the national economic base;

(12) And the department of geography with graduate courses and research in climatology as well as general concern for land use and conservation which are closely related to problems of water resources.

The center will be administered by a director, Allen F. Agnew, professor of geology and former State geologist of South Dakota who joins the faculty of Indiana University in late summer, and three associate directors, Reynold E. Carlson, professor of recreation; Shelby D. Gerking, professor of zoology; and Jerome W. Milliman, professor of business economics and public policy. An executive committee will be formed from representatives of the academic disciplines and departments involved to establish operating policy, objectives, and plans for the research center.

The advisory board to counsel with the director to help identify research needs and provide public liaison will include representation from the fields of interests pertinent to the research goals of the Center. Representation will be invited from State agencies such as the department of conservation, flood control and water resources commission, board of health, department of commerce public relations, industry, and agriculture, and Indiana Port Commission; and from such Federal agencies as the U.S. Geological Survey, U.S. Public Health Service, Corps of Army Engineers, Soil Conservation Service of the Department of Agriculture, and the U.S. Weather Bureau. Also, selected private companies and trade associations will be invited to have representation on the advisory board.

In advance discussion concerning the water resources center plans, Donald E. Foltz, director of the Indiana State Department of Conservation, confirmed the need for a coordinated research approach to water resource problems stating:

"This consolidation of the university's efforts in this important field is a strong step in the right direction. The most important thing needed by the regulatory agencies is the continuous development and updating of a body of fact upon which to base plans, programs, and decisions concerning the ramified aspects of our vital water resources."

Mr. JOHNSON. One thing was missing in the report. When was the research center established?

Dr. AGNEW. In June of this year. Perhaps I should point out that I was not in Indiana. I was the South Dakota State geologist at that time and at the Senate hearings last spring presented testimony from that State.

I came to Indiana the first of September, so our research center is just getting off the ground, although my background in water research and direction of activities has gone back to 1957 in South Dakota.

Mr. JOHNSON. Will this operate pretty much as the gentleman from Michigan State told us earlier?

Dr. AGNEW. I find it difficult to answer that completely because I am hardly dry behind the ears yet. The format for the budget has not yet been established.

We hope to make it an interdepartmental coordinating proposition for research activities rather than a separate department. In this guise it would be similar to that at Michigan State and others.

In addition, we would hope, as the press release points out, to establish liaison with the State agencies concerned with water research

and who might likewise support research at Indiana, and with the land-grant school in Indiana as well.

Mr. JOHNSON. This was created by the board of regents of that university?

Dr. AGNEW. Of Indiana University.

Mr. JOHNSON. Has the State made an appropriation available to carry out these functions?

Dr. AGNEW. No, sir; this has not been requested.

I am operating directly under the vice president for research, as some of the other gentlemen are, within the university.

Mr. JOHNSON. Is there any further statement you would like to make at this time?

Dr. AGNEW. Not at this time, sir.

Mr. JOHNSON. The gentleman from Texas, Mr. Roberts?

Mr. ROBERTS. Doctor, you are just like the rest of them. At least you are open and aboveboard that the date was June 20 so you would be ready to qualify for this when the money got there.

Dr. AGNEW. That is your statement, sir, but that is not my view.

Mr. ROBERTS. Since you are not a land-grant college you will get left at the starting line, anyway, won't you, or is this your way to offset that?

Dr. AGNEW. No, sir. If you would like to refer to the testimony I gave before the Senate last February when I was in the South Dakota situation, there I was allied with the State university as a part-time professor and our land-grant school at South Dakota State College. There we were working out cooperative relationships between the land-grant school and the State geological survey which was doing research in water matters so there would be this coordination at the State level.

Frankly at that time I had no particular concern as to where or how the facility would be set up. The main thing I thought was important was coordination, and to see that the research was done.

Mr. ROBERTS. Is there any reason it should not be done through the National Science Foundation?

Dr. AGNEW. I really can't tell you whether there is any reason. This would be one way of accomplishing it; yes.

Mr. ROBERTS. I have nothing further, Mr. Chairman.

Mr. JOHNSON. The gentleman from Idaho?

Mr. WHITE. I have no questions, Mr. Chairman.

Mr. JOHNSON. The gentleman from Hawaii, Mr. Gill.

Mr. GILL. You mentioned something about State agencies in Indiana having some function in this field. Do you have any such agency?

Dr. AGNEW. Yes, sir; we have several.

Mr. GILL. What are they and what do they do?

Dr. AGNEW. The two state agencies which support most of the research are the State water resources division of the department of conservation. This division cooperating through the U.S. Geological Survey, supports basic research and research of water matters in Indiana.

In addition there is a flood control and water resources commission in Indiana which likewise is supporting work in connection with some of the dam and structures like this, again in basic research.

These are the two agencies which realize our important work in this field.

Mr. GILL. Will this research you do conflict with the work these two agencies are doing?

Dr. AGNEW. In my personal philosophy and view it does not. I have worked for both the Federal Government and State government as well as universities and I feel I personally have the feel for the need for cooperation and desire not to tread on toes and usurp functions of the States, and so on. I would hope that I have offered our cooperation in avoiding duplication.

Mr. GILL. Is either of these State agencies getting Federal funds now?

Dr. AGNEW. The State water resources division of the department of conservation is indirectly through its cooperative relationships with the U.S. Geological Survey. I am sure the State board of health perhaps has cooperative relationships with HEW, too. I have not looked into this yet.

Mr. GILL. Is there any way that these State agencies can be coordinated with the efforts of the University of Indiana or other universities with regard to State funds and Federal funds already being spent?

Dr. AGNEW. I would hope so. I don't feel I am yet in a position to give a very forthright answer on this. I would hope this could be the case. We have offered our cooperation to the State agencies and will be present at some of the State committees concerned with water matters and not directly related to university research. We are moving in that direction.

Mr. GILL. Would it be possible to write into this bill some requirement there be only one State agency in a given State which handles water research matters and receives Federal funds therefrom, or would this complicate the situation?

Dr. AGNEW. It seems to me this would be advisable if it could be done. There have been several amendments proposed to S. 2. I have them all, but I am not sure of the present status of that. I would think this would be highly desirable.

There should be a provision that the State should set up its own coordinating agency. That is a double-edged sword in a sense.

The language of the legislation apparently does not wish to tell the States what to do, and I think wisely, and at the same time it is hoped in the States there would be a competent agency that would be able to do this.

Mr. GILL. I can see certain areas of obvious overlap with the Geological Survey, for example, in stream gaging, tabulations, and so on. It might seem to most of us it would be better to have these things under one roof.

Dr. AGNEW. If I may, I would like to refer to some more of my prepared testimony in partial answer to that statement.

Mr. JOHNSON. Go right ahead.

Dr. AGNEW. On page 5 of my printed statement I am talking about the basic data collection and research program presently going on in the various Federal agencies. I am repeating the words of the committee print I spoke of earlier.

It must be kept in mind that Government agencies have an indispensable place in basic research on water. There is need to strengthen their inhouse basic research to upgrade the quality of their scientific efforts and to provide the requisite competence to guide their overall research programs. Accordingly, funds should be provided to strengthen the inhouse research competence of the Federal agencies, particularly their basic research programs.

I felt in this instance the wording of Senate bill No. 2 might more adequately reflect this feeling if we emphasized the present value of the collection of this basic research and the future need for expansion of that along with the research which would be going on at the university level.

All of us researchers in water, as in anything else, should find it incumbent upon ourselves to use the information available rather than wasting our resources in unnecessary duplication.

The illustration you have mentioned, collection of surface water information, is a good one. They have published this information and it has been made widely available, and working through the local State agency which cooperates with them we would have access to this information immediately and we would look upon this as a basic part in our survey of any projected research proposal before we undertook it so there would not be duplication.

Mr. GILL. In other words, there would be no need to funnel Geological Survey money to the same agency that handed out money under this bill as long as you kept track of what they were doing?

Dr. AGNEW. I am not sure I understand what you meant.

Mr. GILL. Perhaps I dealt with two different concepts without making it clear.

If we give money of the Geological Survey to the various States, we could continue to do this and there would be no real problem so long as the State agency that received money under this particular bill we are considering today was careful not to duplicate any work the Geological Survey already was doing and was careful to keep in touch with them so there would be no duplication in the future.

Dr. AGNEW. I agree with you wholeheartedly on that. This is what I meant to read in my concluding remarks here.

You gentlemen are well aware of the need for cooperation and coordination.

Just as the desire for cooperation and coordination is a basic factor in the establishment of a water resources research center at a university, even more is there the necessity for close liaison between the university centers and the Water Resources Service of the Department of the Interior that would be administering the program as outlined in Senate bill S. 2. And equally necessary must be the close cooperation of the several Federal agencies which themselves conduct research in water matters.

My feeling is expressed in that paragraph, that only with such an outlook of cooperation and mutual participation by all parties involved in the administration and performance of the water resources research program—at the Federal, at the interstate, and interuniversity, and at the university levels—only then will maximum efficiency be attained and the optimum development of our Nation's water resources realized.

Mr. JOHNSON. Further questions?

Mr. McFARLAND. You mentioned the Water Resources Service of the Department of the Interior. That is not in S. 2 anymore.

Dr. AGNEW. All right, sir.

Mr. McFARLAND. It does not have to be a new agency in Interior, does it?

Dr. AGNEW. No, the coordinating Federal agency.

Mr. McFARLAND. That is all, Mr. Chairman.

Mr. JOHNSON. If there are no further questions we will thank you, Dr. Agnew, for your paper and comments.

We shall now go on to the next witness from the University of Texas, Dr. Earnest F. Gloyna, director, Center of Research and Water Development.

STATEMENT OF DR. EARNEST F. GLOYNA, DIRECTOR, CENTER FOR RESEARCH IN WATER RESOURCES

Dr. GLOYNA. Mr. Chairman, my name is Earnest F. Gloyna. I am a professor and director of the Center for Research in Water Resources at the University of Texas, Austin, Tex. The privilege of preparing a statement and appearing before your committee on this extremely important matter is indeed very much appreciated.

The administration, faculty, and staff of the University of Texas recognize the need for expanding education and research in all aspects of the water problem. It is clear that a sound but flexible means must be found for supporting and stimulating basic research related to water resources. Legislation such as that proposed in Senate bill S. 2 is certainly an appropriate and desirable step. This legislation would not only stimulate research in water resources as it sets out to do, but also, as a bonus, would help produce the next generation of properly trained individuals for continuing work in this field.

It is reasonable that several research centers such as are proposed will have to be established. There is a wide variation in local water requirements, climatic conditions, and water laws. Many research disciplines must be brought to bear in achieving the desired solution of our water resources problems.

As the committee knows, the many volumes of reports on water contain usable information on measuring and describing water supplies in the United States. However, these topics must be brought under more intensive scrutiny in order to increase our basic understanding and therefore make possible more effective application of the information to our problems. The history of water development has been one which is characteristic of a massive action program coupled with a much less intensive investigational effort. Among those areas which have not been probed in depth are the basic ones of water-waste behavior complexes, water law theory, fundamental hydrosciences, socioeconomic aspects of recreation, food-water relationships, and conservation.

We wish to bring into sharp focus the imbalance between fundamental research based on a multidisciplinary effort, applied research, and pure action programs. For instance, the single-program concept adhered to by some at the present time does not stimulate the necessary production of skilled and talented people in the field of water resources. In many local situations and in the Federal Government

the most critical shortage in the field of water resources is that of the broadly trained person capable of planning and executing research programs. The water problem is a very comprehensive one and thus deserves the combined attention of the best legal, technical, and social-planning minds available.

In areas where water is scarce, technological knowledge may compensate in part for water shortages. For example, the reuse of industrial and domestic waste waters and other conservation programs have been found to be not only economically sound, but necessary. At this time it has been estimated by some that the water-related construction program for the State of Texas alone could exceed \$4 billion by the year 2000. Certainly, such a large program should be preceded by extensive basic research and by corresponding educational efforts.

It is assumed that the designation "land-grant colleges" in the proposed legislation does not imply that it is to be the overriding factor in the selection of the proposed centers of research in water resources. The competence of university research groups, the facilities, and the general level of academic excellence certainly should serve as a sound guide for the selection of such centers.

In this connection, the University of Texas has knowledgeable and interested faculty ready for the expanded research which is anticipated. The important point is that the university will not have to draw personnel from the already critically short available pool of individuals working in the water field, either in Government or in private industry. Further, by virtue of such research we will be undertaking the training of many young persons who themselves will be useful in the expanding water-management programs.

The experienced faculty and staff research teams at the University of Texas have longstanding interests in water resources research. These activities represent the fields of water law, engineering, biological and physical sciences, social sciences, and marine science. The interested faculty members and research groups are familiar with the needs of the arid parts, as well as the wet and humid sections, of Texas. They recognize clearly the water requirements of agricultural areas, the rapidly growing industrial sections, and the ever-expanding municipal developments. They are familiar with the problems of water development, treatment, conservation, and cost benefits. They have available in their files problems of local, State, and regional interest.

We endorse Senate bill S. 2.

Mr. JOHNSON. We want to thank you, Doctor, for your very fine statement in support of the bill.

Before I turn this over to any questions, there is one matter here that the chairman of the full committee wanted a little information on. It seems the hailstones were so big in the State of Texas last year that they almost ruined the Vice President's holdings down there. There was a grant made to the University of Western Australia, physics, on the growth of the hailstones, and there was a \$22,000 appropriation. The chairman would like to know the value that might come from this study.

Dr. GLOYNA. I am not familiar with the particular project. We do have some problems with hail. I do not believe I would like to

comment on this now, but I would gather the information for you at a latter date.

Mr. JOHNSON. It seems the hailstones are getting larger and certainly you people had your share of hailstorms during this last year, as well as other States in the same area.

I would suggest if you can find out for us we would like to have you give us your comments on this particular grant of the National Science Foundation to the University of Western Australia.

The gentleman from Texas, Mr. Roberts?

Mr. ROBERTS. Thank you, Mr. Chairman.

Dr. GLOYNA, welcome to Washington. How long have you been out at the university?

Dr. GLOYNA. I joined the university in 1947. I was on leave for several years.

Mr. ROBERTS. Are you a part of the Balcones research center group, Dr. J. E. N. Thompson group?

Dr. GLOYNA. Yes, I am head of the environmental health engineering laboratories at the center.

Mr. ROBERTS. You made the statement you assumed this did not mean what it said. What would be your attitude when it is all given to Texas A. & M.?

Dr. GLOYNA. If it were given to Texas A. & M., of course we would work with them.

The object in making this statement has lost some of its significance since I understand that we are now a member of the Association of Land Grant Colleges and associated members. I did not know this when I left the university, since this has happened in the last few days.

Mr. ROBERTS. Doctor, aren't the programs that we are talking about here today actually already being accomplished down there through the Texas Water Commission, which has a budget of \$5 million this year probably, and then your geologic survey? I know you are familiar that the Vice President instituted a program several years ago with the Geological Survey and the Texas Water Commission, which made a complete inventory of Texas and any projected water study of the needs of Texas for 100 years, which was published last year, I guess, in four or five volumes. How would you add to that?

Dr. GLOYNA. Yes, sir. I am familiar with the programs that you have described and have participated in the preparation of some of those. These programs are planning programs in part and rightly so, and many of the programs that are underway today are data collection programs, and applied investigational type efforts. The point that we would like to emphasize is that we do need funds to further the basic research interests in the water area.

We are going to have many, many problems within our own State that will have to be solved before we can continue to plan into the future, not only a matter of data collection, but a matter of research and quality dynamics of movement of water, whether to put it underground rather than to put it into some surface storage facilities; we need some basic research into water law theory. We have some problems in that respect. Many of these things should be looked at from a fundamental point of view at the university level, at the academic level, the research level. Then they can be put to better use, I think, by the planners.

Mr. ROBERTS. This is broad enough to include a study into water law theory? You would think it would go that far?

Dr. GLOYNA. Our center at the university, which was formalized last spring, but was started 3 years ago—I want to put that into the record—

Mr. ROBERTS. Soon after Senate passage of the bill.

Dr. GLOYNA. But emphasis was started 3 years ago.

Our center has on its advisory group a professor from the law school whose interest is in water law and one of the objectives of the center will be to carry this part just as it would the physical and biological sciences aspects of our marine station or the engineering problems in hydrodynamics or water quality.

Mr. ROBERTS. Thank you very much, Doctor. I am delighted that you, at least, did not let all these other States set up the new deals to get this money without you getting into the picture. I am at least glad you got into the picture. Thank you.

I have no further questions, Mr. Chairman.

Mr. JOHNSON. The gentleman from Idaho, Mr. White.

Mr. WHITE. Just to explore your thinking a little farther, Doctor, as suggested by the Congressman from Texas as to what you are presently doing in the State of Texas, and what you could do in addition, it would seem to me that a good deal of the importance, the Congressman referred to, was on the applied uses of water more than on basic water research. Am I correct in making that assumption?

Dr. GLOYNA. This, of course, is based on some of the facts and figures that we had available today and the best planning that we could project based on this information that was available today.

Mr. WHITE. But that was applied usage of water.

Dr. GLOYNA. Yes, sir; it was applied.

Mr. WHITE. And under this program there would be more basic research completed rather than applied analysis of the problem that does exist or may exist in the future?

Dr. GLOYNA. We would undertake those problems that would necessarily have very basic applications because we are interested in using these in our graduate student programs, in our faculty programs, and in this case, I would like to emphasize the point that was brought out earlier, this is a self-monitoring sort of thing because no Ph. D. doctoral student wants to work on a problem that someone else is working on.

Mr. WHITE. Not necessarily on application.

Dr. GLOYNA. Not on application, but on pure research.

Mr. WHITE. I just wanted to make sure that my thought was correct as to what the report and what the intent was. I have no further questions.

Mr. JOHNSON. The gentleman from Hawaii, Mr. Gill.

Mr. GILL. Yes.

Doctor, with a State the size of Texas, with not only a large land area but the wide variance of conditions that I understand you have down there, is one center enough?

Dr. GLOYNA. Possibly we could have groups working on different problems. This question has not arisen as to how the problems would be allocated, but quite frequently a problem, a basic research problem at a university or a center takes on the characteristics of the man who

is putting the energy into that problem. If his particular interest happens to be the broader basic problems of water research this is what the center is going to do. It could be possible that in one area they would want to look into problems associated with our 800 or 900 miles of coastline, whereas in another case they would want to look into problems of ground water for irrigation.

Mr. GILL. Who looks into your ground water problem now?

Dr. GLOYNA. Sir?

Mr. GILL. Who looks into the problem of ground water in Texas at the present time?

Dr. GLOYNA. From the applied point of view we have a water commission that monitors the ground water problem as a whole. I can think of 300 universities that have interests and are doing some research in ground water at this time, including our own.

Mr. GILL. Does your agency that has control of this do any basic research or does it really concentrate on determining the level and consistency of the ground water?

Dr. GLOYNA. Essentially our State agencies are planning agencies, basic data collecting agencies and in this respect there is some research but as I see research, from an academic point of view, these are not basic research or fundamental research programs.

Mr. GILL. Are there programs which would tend to assist the basic research program?

Dr. GLOYNA. Yes, sir. As a matter of fact, we are cooperating with one of the State agencies now on the interagency contract where we are providing some of the basic work, they are doing the more applied work. All of it is going to come out as a final report. We participate in this respect personnelwise as well.

Mr. GILL. You say you have 11 State agencies involved in this general problem?

Dr. GLOYNA. No, I did not.

Mr. GILL. I thought I heard you say 11.

Dr. GLOYNA. I didn't mean 11.

Mr. GILL. How many agencies do you have in the State of Texas that are involved with the water problem? I mean State agencies, not county water boards, and the like.

Dr. GLOYNA. The major agency is our Texas Water Commission. We have the water pollution control board, which works together with the State health department, our railroad commission has responsibilities in salt water production. We have our fish and game commission group. These represent the major groups. There are other organizations that are very active.

Mr. GILL. Are all or any of these State agencies now getting Federal funds for work on special projects?

Dr. GLOYNA. Sir, I suspect most of them are. I would say that the health department is.

Mr. ASPINALL. If my colleague will yield.

Mr. GILL. Certainly.

Mr. ASPINALL. The information which we have in our transcript of the hearings heretofore shows Texas has not received any funds as far as the National Science Foundation is concerned.

Mr. GILL. Perhaps there was money from the Geological Survey and a few of these other Federal agencies that relate to water.

I wonder, Doctor, whether it might be advisable in the bill to require that each State before receiving benefits under this bill not only determine what State agency would be the institute or center that would handle the funds but also submit a State plan outlining the various agencies that they have which are now doing work in the field and which are now receiving Federal funds and, further, lay out the part that all of these State agencies would play in the total research effort. Once that plan was submitted and approved then the Federal funds under this bill could be made available. Would that type thing be workable in your State or is it too cumbersome?

Dr. GLOYNA. I should think the thing that we are interested in here is basic research that would be funneled through some State agency designated by our own Governor and legislation. It would really not be terribly important which agency handled this transfer and kept a monitoring record on the whole picture.

Mr. GILL. Do you think such record should be kept?

Dr. GLOYNA. Presumably this should come under some agency like our water commission that has very strong interest in planning our future water supplies and naturally they would be the ones that would be very interested in having the fruits of this research.

Mr. GILL. Don't you think it would be reassuring not only to the State but to the Federal Government and the Congress if everyone could be assured that there was a total effort toward water development and research and that the effort was carefully thought out and the work was being done in an orderly fashion by all of the various agencies within the State that were interested in it? Wouldn't this be a helpful thing as far as keeping our books straight to know that people would not duplicate research and development?

Dr. GLOYNA. I hardly see where this would be a very difficult problem. We have so many problems to work on that there does not seem to be a possibility of duplicating any major effort at this time.

Mr. GILL. You think the amount of money made available here would probably not make much of a dent in the total problem anyway?

Dr. GLOYNA. I think it would make a great contribution in stimulating the type of work that we at the universities are doing because it would stimulate faculty interest, it would stimulate student interest, it would stimulate the type of interest that it takes to get people to work on a problem.

It would not stimulate much basic data collection type of effort. There just isn't that much money prescribed for that type of program.

Mr. GILL. In other words, the amount of money available here is quite minimal compared to the scope of the problem that you face in your own State?

Dr. GLOYNA. Well, presumably within the State we would make a contribution, too. We are making a contribution at this time. Our university is making a sizable contribution in this area at this time.

Mr. GILL. Do you have the rough amount of dollars that the university is putting into this type research now?

Dr. GLOYNA. I did not come prepared for that question. I note it was being asked but I will provide it. We have a number of full-time people working in the water-related area in the university.

Mr. GILL. Thank you, Mr. Chairman.

Mr. JOHNSON. Are there any further questions?

Mr. McFARLAND. Doctor, let's say Texas is given a \$100,000 grant annually under this act.

What is your understanding as to who makes the decision as to whether the University of Texas gets that or whether Texas A. & M. gets it? Who makes that decision?

Dr. GLOYNA. It is my understanding that our Governor and legislature would make the decision.

Mr. McFARLAND. Wouldn't that be kind of a controversial issue in your State legislature?

Dr. GLOYNA. We are quite competitive, we have a lot of spirit but we think we could work this problem out as we usually work most of our problems out.

Mr. JOHNSON. Congressman Roberts?

Mr. ROBERTS. If Counsel will yield to me, I think the courts decided that some time ago. They had a big kitty and being an Aggie, we got in on their kitty, so that made us in the same family, I believe the courts have held that we belong to the same family. Isn't that right?

Mr. JOHNSON. Yes.

Mr. ROBERTS. Would you make one other thing clear? The chairman of the full committee made a statement with reference to the National Science Foundation money. Are you not getting any National Science grants now? I understand the chancellor to say we had something like \$4 million from the National Science Foundation.

Mr. ASPINALL. If my colleague will yield, the information furnished us shows they are getting \$40,000 for research at Texas A. & M.

Mr. ROBERTS. This is one field of atmospheric thing. Isn't the Balcones Research Center doing a tremendous amount of research for the National Science Foundation?

Dr. GLOYNA. I personally at this moment do not have a grant from the National Science Foundation, but I am almost certain that the University of Texas does.

Mr. ROBERTS. Would you provide us with that information? It would be helpful.

Dr. GLOYNA. Yes, sir.

Mr. JOHNSON. Are there any further questions? If not, we want to thank you, Doctor, for your contribution here.

The next witness will be Dr. C. C. Warnick, associate director, engineering, Experiment Station, University of Idaho.

Mr. WHITE. Mr. Chairman.

Mr. JOHNSON. Congressman White.

Mr. WHITE. I certainly want to express to Mr. Warnick my sincere appreciation for the effort he has gone to to attend these hearings and the long and lengthy period he has waited to give his testimony here today.

It reminds me of my own position in interrogating witnesses here. I am at the end of the line.

Mr. Warnick is in the same position.

I might also say for the benefit of my colleague from Texas that the University of Idaho has had a water resources program going since June of 1961.

Mr. JOHNSON. Dr. Warnick?

Dr. WARNICK. I would like to have my statement included in toto and probably read it. It is not long.

Mr. JOHNSON. Without objection the full statement will appear in the record. The document will be a part of the file.

Dr. WARNICK. Yes. That may be part of the file. I do not think that need be included in the record.

Mr. JOHNSON. The pamphlet entitled "Research in Water Resources for Idaho" will be made a part of the file.

**STATEMENT OF PROF. CALVIN C. WARNICK, RESEARCH PROFESSOR
OF CIVIL ENGINEERING, UNIVERSITY OF IDAHO**

Mr. WARNICK. I am C. C. Warnick, research professor of civil engineering from the University of Idaho and am representing the university as chairman of their policy and coordinating committee on water resources.

The University of Idaho has had an interdisciplinary group concerned with water resources programs within the university since June 1961. This group is known as the policy and coordinating committee on water resources. It also has an advisory committee to this main committee composed of the president of the university and the deans of the divisions of agriculture, engineering, forestry, and mines. The composition of the committee is presently constituted as follows:

G. L. Corey, agricultural engineering.

D. W. Fitzsimmons, agricultural engineering.

D. C. Larsen, agricultural extension (Boise).

F. D. Johnson, forestry.

C. MacPhee, forestry.

G. C. Lewis, agricultural soils and chemistry.

R. L. Jones, geology.

T. R. Walenta, law.

W. E. Folz, agricultural economics.

P. Mann, electrical engineering.

P. A. Buscemi, zoology.

C. C. Warnick, chairman, civil engineering.

The group has experienced encouraging progress in gaining greater cooperation between departments and through seminars sponsored by the group has become more aware of each others problems. This group has inventoried course offerings, research in progress, and also agree on priority of research needs in the State.

However, Idaho has very complex problems in even just the study of water and few people are actively engaged in the study of the problems. Likewise funding for such activities is limited under the present economy of the State. Each of the people mentioned have many other duties and the need is great to have assistance through the hiring of new staff and graduate assistants. There has been concern expressed over problems of supplying of staff and it is a real one. Several of the staff at Idaho have particular talent and are sought by other institutions. An illustration of this might be a professor in ground water geology having to teach other sections of other geology courses that could be taught by other staff not having this special qualification in ground water geology.

If relief is provided in assignments that presently are not directed toward their major interest of water there is a much better chance of retaining these people. At the same time there will develop much

more activity throughout the State because these staff members would have time to talk to those out in the field experiencing the actual problem.

Idaho is a State with limited funding resources at this time. The university is small as State universities go and its staff of a necessity is extended over a broad coverage of subject matter. Funding from the national level as provided in Senate bill 2 would provide needed secretarial staff, money for salaries to hire new staff to relieve the load carried by those who do have extra duties outside their major interest. In many cases this could be done by hiring of people in less critical demand than water scientists. The funds could be used to send staff representatives to technical conferences to present the ideas and new knowledge found in the research at Idaho.

Idaho, a mountainous State with several large rivers that are fed by snowmelt, has unique hydrologic conditions. The great underground aquifers of Idaho are relatively unexplored and problems of identifying source and depletion are of urgent need to further develop the economy of the State.

The teaching and training of young people within the State to meet this challenge is the No. 1 problem. These young people are desirous of staying in the State and a combination of talent and solutions to pressing water problems needs to be forged together. This can best be done in the type of program proposed under Senate bill 2.

To further this work from the State level President D. R. Theophilus proposes to present to our regents at their October 24, 1963, meeting a resolution calling for formal establishment of a Water Resources Research Institute at the University of Idaho. Such a group must of necessity be unified in purpose with surrounding States groups. It is the consensus of the University of Idaho that the provisions of Senate bill 2 would assure this. The university has already been active with the University Council on Hydrology, a group of universities organized to further activities in the teaching and research in the hydrologic disciplines. The University of Idaho supports the action of that group and also the action of the National Association of State Universities and Land-Grant Colleges.

Mr. JOHNSON. We want to thank you, Mr. Warnick, for your statement.

The gentleman from Colorado.

Mr. ASPINALL. How many universities do you have in Idaho now?

Dr. WARNICK. We presently have two universities. Since June of this year we have a new State university at Pocatello, known as Idaho State University.

Mr. ASPINALL. The University of Moscow is a land-grant college, is that right?

Dr. WARNICK. Yes, sir.

Mr. ASPINALL. How many students do you have?

Dr. WARNICK. We have 5,000 at the University of Idaho.

Mr. ASPINALL. Thank you.

Mr. JOHNSON. The gentleman from Texas, Mr. Roberts.

Mr. ROBERTS. Thank you, Mr. Chairman. I will yield my time to the gentleman from Idaho, if I may.

Mr. JOHNSON. The gentleman from Idaho, Mr. White.

Mr. WHITE. Thank you, Mr. Chairman.

I was remiss in my introduction of Dr. Warnick in that I did not indicate that Dr. Theophilus is also president of the University of Idaho and has taken a very sincere interest in the water resources of the United States, particularly the western part of the United States, and it is my understanding he has been a member of the water resources committee who testified here at the beginning of the hearings, today.

Dr. Warnick, it has been said that research by State universities may not be as economic or as efficient as a more centralized program. Would you like to comment on that?

Dr. WARNICK. Well, I have had the opportunity of observing some of the research activities of the so-called in-house of the Federal agencies, and it is of good quality I think, but I think there is in my own opinion—many times a small university like our own can do things cheaper and many times even more expeditiously.

I may illustrate it by this: Quite frequently some of the Federal agency people come to our university to have us do work. I remember one case a couple or 3 years ago where the Corps of Engineers came to us to have a study made of some metals for sliding gates on dams. They had facilities to do some of this, but we could do it much more expeditiously and even more cheaply than they. I think this is a case of more applied research, but I think normally we can, in many cases, do this.

Mr. WHITE. What is the specific purpose of the University of Idaho's water resource lab at the present time?

Dr. WARNICK. Will you state that again?

Mr. WHITE. What are the specific purposes of the University of Idaho's laboratory, now?

Dr. WARNICK. It isn't exactly a laboratory. It is still just in the state of a committee and the purposes are to provide a greater service to our State in the area of water study.

Right now I am embarrassed in my own State that we do not have a very extensive program at all in water. We have the State agencies that are quite common and that have been spoken of previously here, but we have very, very limited activity in that area. I believe that this is the role of the university, to help train people and interest them in this activity. Certainly I suspect that Idaho has one of the greater undeveloped water potentials of almost any State in the country, and probably the reason we have is the demand for water and the number of humans and with people actively using the water that is less than other States. I think it was a grand opportunity in my case to work in States where we can see and benefit from the mistakes of some States who have been pressed faster than we have in developing their water resources.

Mr. WHITE. Would the program as contemplated by S. 2 inhibit your program?

Dr. WARNICK. It certainly wouldn't. We feel it is almost a necessity to get ourselves going on the level we would like. We would certainly go ahead with our water resources research institute without it, but we are one of those States I think that happens to be in the economic state of development that really requires this funding.

Mr. WHITE. That more or less answers this next question. Why do you need Federal funds for the continuation of your research? Because of the expanding need in the southern part of the State at the present time, and because of the economic situation in the area?

Dr. WARNICK. Yes.

Mr. WHITE. Would the University of Idaho be able to implement the programs to be established under S. 2?

Dr. WARNICK. We have done quite a considerable amount of work toward that now. I am sure we have as an aim doing that. I am sure we can do that. As outlined in my testimony, here, we hope we can release some of our people to have a little more time to devote to the specific area. We will maybe be going down to the University of California and crying on their doorstep to get a few people to help us.

Mr. WHITE. This question has been raised before at previous hearings and wasn't discussed to any great extent today, but do you think it is necessary to have a research program in each and every State?

Dr. WARNICK. I certainly cannot argue that it should be in each and every State, but certainly in most of them it is essential because of the uniqueness of the hydrologic conditions, the laws of the State, the need for having it close at hand. The water we are talking about is in the State and the problem is there, and I think you cannot many times take the problem away from its actual source. When you start studying ground water, you can't study ground water in Kentucky for Idaho, even though they both have ground water. Ours is in salt rock and theirs is in some other kind of formation. We find a tremendous difference in behavior of the waters.

Mr. WHITE. Professor Warnick, I certainly want to thank you for your testimony.

Mr. Chairman, I have no further questions.

Mr. JOHNSON. The gentleman from Hawaii, Mr. Gill.

Mr. GILL. Doctor, how many State agencies do you have that are involved in either the research of water resources or the development of water resources?

Dr. WARNICK. I think we have the normal group of them. The basic one is our State department of reclamation which is by law designated to more or less shepherd the waters and also to plan. As presently constituted it probably has a staff of three people, none of them younger than 70 years old. I don't think there is any group very active in research as such in our State, in the State agencies.

Our committee has met with the State agencies on several occasions and are trying to unify the idea of needs and we were actually called on to work with our legislature in the last session. I went down and appeared with them.

Mr. GILL. I gather from what you say that the legislature did not rely heavily on the State department of reclamation for water resources information.

Dr. WARNICK. Not at this time.

Mr. GILL. Are there any other States agencies having to do with this general problem?

Dr. WARNICK. The State health department is concerned. The bureau of mines and geology is concerned to some extent, but there again, I am sure that they have very little funding. I think in the

last legislature they were asking for a little funding to get their chance to work in the ground water field.

Mr. GILL. You are prepared to say none of your State agencies which handle problems related to water resources are doing any basic research in the area at the present time?

Dr. WARNICK. Certainly I can say that they are not.

Mr. GILL. Are there any other agencies outside of the university who might be interested in doing such research? You mentioned you had a new college at Pocatello?

Dr. WARNICK. Idaho State University may at some time be interested. Presently they do not have colleges that normally work on this. They have a letters and science division and they have a pharmaceutical school, but no—I think there may be somebody trained in zoology who might be interested and we feel if they have the talents we would welcome the chance to work with them.

We have under our State system a single regency over the university so that does act to coordinate.

Mr. GILL. Are there any Federal agencies in your State doing basic water research?

Dr. WARNICK. I am sure there are. I think one quite active in this area is the Atomic Energy Commission. As you know, we have a testing station in Idaho and we are interested in what they are doing. Presently they are asking for cooperation with us to lead and sponsor a research and teaching program at Idaho Falls with them and we think this is highly desirable.

Mr. GILL. Do they do water research work?

Dr. WARNICK. Yes, they are doing some rather fine work in the study of movement of ground water. As you well realize, the wastes from some of their reactors is a concern, certainly in our State, where there is a tremendous underground body of water. We are concerned with what they are going to do with it so they are doing some very fine work on that.

Mr. GILL. Whatever work they are doing now is to be coordinated with a future water research program if it is established at your university?

Dr. WARNICK. We are working presently on the movement of ground water where we will cooperate directly with them.

Mr. GILL. Thank you, Mr. Chairman.

Mr. JOHNSON. The chairman of the full committee.

Mr. ASPINALL. Dr. Warnick, I will just ask this question out of my own curiosity. You referred to the difference in the study of ground waters in Kentucky and Idaho. Do you know of any publication that we have at the present time on the effect of water on all the elements, or the ordinary combination of elements that you find in nature?

Dr. WARNICK. Do you mean the actual effect of various elements on the ground water as it comes out of the aquifer? I am not knowledgeable as to the portions of this that have been attacked. In our community we have a lot of iron in our domestic water supply.

Mr. ASPINALL. You are not nearly as unfortunate as those who have boron in it.

Dr. WARNICK. No. We have professors who come and smell the water and leave.

Mr. JOHNSON. We want to thank you, Dr. Warnick, for your presentation here to the committee on this particular matter. You being the last witness, if there are no further questions, the committee will stand adjourned until 9:45 tomorrow morning.

Mr. GILL. Mr. Chairman, I don't like to be left out of this parade of presidents. I have a letter from the president of the University of Hawaii which indicates an interest in the problem and, if it is agreeable with the chairman, I will submit it.

Mr. JOHNSON. We will have other statements to put in tomorrow. We can put it in now, if you prefer.

Mr. GILL. You can put it in now, if you want.

Mr. JOHNSON. The record will show this particular letter from the University of Hawaii as received by the committee, as a part of the record.

Mr. GILL. Thank you.

(The document referred to follows:)

UNIVERSITY OF HAWAII,
Honolulu, Hawaii, September 18, 1963.

HON. THOMAS P. GILL,

Congressman from Hawaii, New House Office Building, Washington, D.C.

DEAR TOM: It occurred to me that it might be helpful if I could pass on some of the thinking of our faculty which leads us to hope that the Senate-passed water resources research bill S. 2 will become law. Perhaps you may find it useful for the hearing in the House Committee on Interior and Insular Affairs, scheduled for September 30 and October 1.

The economic growth of the State of Hawaii has been thus far made in large measure possible through the continual modification and expansion of water resources development. Problems of locating, analyzing, and conserving water supplies arise continually. Needs for water resources research are pressing, and unique situations make local research essential. This has been documented by governmental agencies and private organizations.

The university is pleased to have had faculty members contributing significant research of this sort. Recently the development of the university has witnessed an increased number of personnel capable of and interested in conducting quality research in what is essentially a multidisciplinary field.

We have not, however, been able to conduct the water research which we would like to, and Dean Holmes has put it well in saying that this is not because of lack of interest or problems, but because of the limitation on funds.

The university has a committee on water resources research, consisting of members both from the campus and off the campus, including individuals concerned with engineering, public health, agriculture, the geosciences; hydraulicians, hydrologist-geologist, geophysicist, agronomist, sanitary scientist, and the biomedical scientist. This committee recently summarized Hawaii's resource research efforts over the past 5 to 6 years confirming our guess that far too little research efforts have been expended in comparison with the size of the problem. The committee has unanimously recommended additional resources including funding be developed and a permanent research center in this area be established at the University of Hawaii. The committee is also completing an annotated listing of major deficient areas in Hawaii water resources research which are in need of intensified attention.

We shall be happy to supply you copies of the inventory and listings upon your request.

We are encouraged by your support of this bill and wish to express our firm belief in its benefits.

Sincerely yours,

THOMAS H. HAMILTON, *President.*

Mr. JOHNSON. If there is no further business, the committee will stand adjourned until tomorrow morning at 9:45.

(Whereupon, at 5 p.m., the subcommittee adjourned to reconvene at 9:45 a.m., Tuesday, October 1, 1963.)

WATER RESOURCES RESEARCH CENTER

TUESDAY, OCTOBER 1, 1963

HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON IRRIGATION AND RECLAMATION
OF THE COMMITTEE ON INTERIOR AND INSULAR AFFAIRS,
Washington, D.C.

The subcommittee met at 9:45 a.m., in room 1324, Longworth House Office Building, Hon. Wayne N. Aspinall (acting chairman of the subcommittee) presiding.

Mr. ASPINALL. The Subcommittee on Irrigation and Reclamation will now be in session for further consideration of S. 2 and similar House bills.

The first witness this morning will be Dr. Robert O. Vernon, Association of American State Geologists, State geologist of Florida and water cooperators in various other States.

Before the committee started its session this morning, our colleague, Mr. Sikes, of Florida, introduced Dr. Vernon to me and suggested that they have only had three State geologists in Florida; the first served 16 years; the second served 32 years, and Dr. Vernon is now going to serve double that time.

In other words, he is serving the people of Florida and has been recognized by them.

Dr. Vernon, will you take the witness table and I will let our colleague, Mr. Haley, say anything he wishes to.

Mr. HALEY. Mr. Chairman, and members of the committee, we are very happy to have the good doctor with us this morning.

I know that he appreciates being first on the list this morning so that he can get back to enjoy the State of Florida.

With his tenure of office we get a good man and we intend to keep him there. The doctor is rather new on the job. He has only been there a few years but I hope he will serve 30 or 40 years. We want to keep him there. People live longer in Florida than anywhere else and, Doctor, we are glad to have you.

STATEMENT OF DR. ROBERT O. VERNON, ASSOCIATION OF AMERICAN STATE GEOLOGISTS, STATE GEOLOGIST OF FLORIDA AND WATER COOPERATORS IN VARIOUS OTHER STATES; ACCOMPANIED BY DR. JOE PEOPLES, OF CONNECTICUT

Dr. VERNON. Thank you, Mr. Aspinall, and my good friend, Mr. Haley and Mr. Johnson. I feel that I cannot address the committee as a whole in that way since there are so few.

I am delighted to be here and I hope I can live up to these accolades.

I would like to introduce an associate from the American Association of State Geologists, Dr. Joe Peoples from Connecticut.

Joe, won't you come up here since you may assist in some questions?

Mr. ASPINALL. Doctor?

Dr. PEOPLES. P-e-o-p-l-e-s, J. W.

Mr. ASPINALL. Off the record.

(Discussion off the record.)

Dr. VERNON. Gentlemen of the committee, it would appear to us that those in the United States who have the greatest interest in this legislation, the water engineers, and the State geologists who have been given the responsibility for developing the water facts of their individual States have not sought to be heard on this legislation. Therefore, we have discussed this among us in our association and we did seek to be heard relative to these bills.

Mr. ASPINALL. We are glad to have you with us, Doctor.

Dr. VERNON. Thank you, sir.

I have a statement which Mr. Philip E. LaMoreaux, State geologist of Alabama, asked me to present to the committee, and with the permission of the commission, I will ask that it be reproduced in the committee hearings.

Mr. ASPINALL. Are you going to testify to the statement?

Dr. VERNON. No, sir; I will not touch on that statement but it is similar to mine, however.

Mr. ASPINALL. Without objection, the statement of the State geologist of Alabama will be placed in the record at the end of the testimony given by Dr. Vernon.

Hearing no objection, it is so ordered.

Dr. Vernon, may I say this off the record?

(Discussion off the record.)

Mr. ASPINALL. You may proceed.

Dr. VERNON. Mr. Aspinall, I represent a number of people and I will try to keep it clear as to whom I speak for.

First, I would like to present a resolution that was adopted by the American Association of State Geologists at Morgantown, W. Va., on May 7, 1963.

Mr. ASPINALL. Doctor, I wish you would go ahead with your own statement and then present those statements afterward.

Dr. VERNON. All right, sir.

Speaking for myself and for about 15 other State geologists and water engineers, I would like to present and read the rather short statement I have relative to these bills.

The water research bills being considered as H.R. 2683, H.R. 2689, H.R. 4048, H.R. 7234, H.R. 7239, H.R. 7258, and S. 2 will strengthen and improve hydrologic education and research. However, with slight modification the bill finally adopted can be made even more effective. The suggestions that follow are concerned with the need (1) for research at the national level; (2) for providing adequate recognition of existing water resource data programs in the bill; and (3) for strengthening the educational effort of the university programs.

Since our water resources and the attendant problems developed with use have no regard for State boundaries, the national interest would require that all research groups in water be supplemented by a nationally oriented organization, large enough and provided with the special skills and laboratories to conduct a coordinated research pro-

gram. Only through such a program can the Nation be provided the technical personnel with professional competence to (1) develop all the water facts of the Nation upon which some national water policy and management programs can be built; and (2) to formulate some plan of action that will meet the needs of the Nation. Only those who have participated in water-data programs oriented to both State and National needs, are competent to compile these data.

A strengthened university effort must be combined with a strong National and State program of research and data collection. There is a danger that if national objectives are not established much work will be duplicated in the 51 institutes to be established and many other objectives will be ignored. To assure some national direction, one Federal agency now having national responsibilities covering a broad part of the hydrologic field and whose mission is improved knowledge and factfinding, unrelated to regulation, management, or construction and development should be designated in the bill as the primary national water research agency.

The U.S. Geological Survey comes closest to filling these requirements. If the present research programs of this department were strengthened by specific language in the bill, the national needs for research in water would be met.

Many other Federal agencies, having more specific missions to meet in the water resource field, should be provided adequate funds to meet their responsibilities. The Department of Agriculture, the Corps of Engineers, the Bureau of Reclamation, and the Weather Bureau must maintain programs of research in water, and have not been provided funds to provide an adequate knowledge in the fields of agriculture, flood control and management, irrigation, supply, and climate.

Many kinds of research in water require long periods of time to span periods of famine and flood. The U.S. Geological Survey and the State agencies that have responsibilities in water data development provide the required continuity to conduct long-term and field-oriented problems. Most of the research in water is dependent upon the data-collecting programs, and in turn the research will control the direction of data collection. These programs are the joint responsibility of State and Federal agencies.

The legislation on water research does not recognize the existing cooperative water-data and water-research programs between the U.S. Geological Survey and the several States. The spread of effort created by this legislation will ultimately limit the funds available for this cooperative effort by bringing the cooperative programs into competition for funds against the newly created water institutes.

To obtain its objectives the legislation on water research should incorporate provisions to maintain a strong nationwide basic-data effort with uniform standards.

Hydrology is included as a discipline in a few colleges and universities and taught casually in only a few others. A study (Federal Council for Science and Technology) in 1962 of 250 universities and colleges found only 59 listed courses in hydrology and only 14 gave graduate credit for studies.

A report published in *Geotimes*, volume 12, No. 7, dated April 1963, contains this statement:

A greatly expanded number of trained scientists was identified as the outstanding need in hydrology. To meet this need in education, the committee strongly endorses the recently formed University Council on Hydrology.

Other statements in the Interuniversity Conference on Hydrology at Lake Arrowhead, Calif., in September 1962 include a strong endorsement for increased training at the university level. Publication 1000-b of the NASRC, 1962, entitled "Water Resources, a Report to the Committee on Natural Resources of the NASRC," by Amile Wohlman, chairman of the water resources committee, stated, "The most critical shortage by far in the area of water resources is the very real shortage of broadly trained people capable of planning and executing effective research programs."

A little further on, he says:

* * * To accomplish this major task well, the most urgent need is the establishment of a program to enlist and train new people in virtually all disciplines relating to water resources.

To strengthen the whole hydrology sciences field, now pathetically limited, for the tasks involved, will require immediate provision for major expansion in specialized education programs and facilities, both within the Government and within the universities.

Another strong endorsement is contained in "Scientific Hydrology," a report of the Federal Council for Science and Technology, published in June 1962.

Of 2,500 scientists contacted in the most recent manpower survey, that recorded some competence in hydrology, only 4 percent were in education and 85 percent were in existing data-collection programs. The Federal Council report (p. 17) recommends that the scope and extent of hydrologic research be broadened as a part of graduate training. The legislation under consideration includes training (the greatest expressed need) in the language as an afterthought. Teaching of hydrology should be the primary mission of the university system and research should be restricted to that required for a vigorous graduate program.

In summary, the legislation on water research would achieve its designed objectives if—

(1) A National Research Institute were created and the responsibilities for national research in water were given to those Federal agencies now having missions in these fields, and if—this would be in addition to the present proviso of the bill. Title II could well be implemented through the National Science Foundation but I think there is still a need for a definition of a National Research Institute.

(2) The existing programs of water research and data collection between the U.S. Geological Survey and the States were stressed and the water institutes were specifically prevented from duplicating these efforts; and if—

(3) The water institutes were encouraged to implement and strengthen the curriculums in hydrology, with research being restricted to that required for a healthy graduate program—this could be implemented under title I as a direct grant to university systems and without duplicating anything that is being currently processed in the States by the data-development agencies who have programs in these fields.

The bill could also be changed and modified and benefited if—

(4) Initially the institutes were established at selected schools where adequate talent is available for instructional purposes. These schools could be established regionally and would result in a much stronger program than that proposed under the legislation under consideration.

I will present the resolution and ask that it be reproduced. In effect, the resolution recommends an accelerated data-collecting program, recommends that this be retained within the Geological Survey of the Department of Interior, and resolves that some analysis and synthesis of that data be developed by that agency. This is for the entire Association of American State Geologists and I would present it to you. That document is attached to the back of the statement.

Mr. ASPINALL. If there is no objection, the resolution on expansion of basic water data program of Geological Survey of the Department of the Interior, signed by Earl Cook, president, on May 7, 1963, at Morgantown, W. Va., will be made a part of the record.

(The resolution follows:)

RESOLUTION ON EXPANSION OF BASIC WATER DATA PROGRAM OF GEOLOGICAL SURVEY OF THE DEPARTMENT OF THE INTERIOR

Whereas problems of water supply and utilization are progressively increasing in the several States and are reaching a critical stage in some areas; and

Whereas there is a need for accelerated data collection and appraisal of the Nation's water resources; and

Whereas the Geological Survey of the Department of the Interior has for three-quarters of a century been the primary national agency for collection of basic water data and the dissemination of water resource information: Therefore, be it

Resolved by the Association of American State Geologists in annual meeting assembled, That the members of the association urge the expansion and acceleration of the program for collection of basic water data by the Geological Survey, that provision be made for adequate analysis and synthesis of these data, and that adequate liaison with, and utilization of, existing water-resources agencies in the several States be developed.

Attested:

EARL COOK, *President.*

MORGANTOWN, W. VA., May 7, 1963.

STATEMENT OF PHILIP E. LAMOREAUX, STATE GEOLOGIST OF ALABAMA

The water research bills being considered as H.R. 2683, H.R. 2689, H.R. 4048, and S. 2 will strengthen and improve hydrologic education and research. However, with slight modification, the bill finally adopted can be made more effective. The suggestions that follow are concerned with the need: (1) To strengthen the academic training of hydrologists in university programs in the Nation; (2) to provide adequate financing for basic data collecting, applied research, and basic research programs by recognizing and supporting the valuable existing water resources programs.

A recent Senate Select Committee pointed out that our Nation uses 300 billion gallons of water a day at the present, and that within 20 years, or by 1980, we will be doubling the demand on our water resources by using 600 billion gallons of water a day.

With this great increase in the use of surface and ground water there will be a corresponding increase in the number and complexity of water problems, especially in the field of water development and pollution. This will result in a similar increase in the demand for competently trained people in all fields of hydrology. The deficiency of trained personnel is recognized by water authorities in Federal and State agencies, in academic circles in the United States,

and by our colleagues throughout the world. It is well documented by several detailed studies of manpower needs.

Fifteen years ago there were less than a half dozen universities giving courses in ground water; today approximately 65 universities give 1 or more courses. However, the number of adequate academic programs giving training in hydrology to the master's degree or doctoral degree level can be counted on the fingers of one's hand. Yet our country must have adequate know-how to double its water supply if we are to continue to expand as planned during the next 20 years.

To develop fully the water resources of our Nation will require the coordinated efforts of local, State, and Federal agencies as well as research foundations and universities. Water resources programs that are imperative and must be carried out can be broken into three different activities of work. Their adequacy in general is as follows.

Basic data collection: The collection of water levels, streamflow discharge, quality and temperature of water from key or index wells, springs and streams, etc. These programs are at present reasonably adequate and carried out mainly by cooperative programs of local, Federal, and State agencies.

Applied research programs directed at describing where, how much, and what quality of surface and ground water is available in the United States. This work is carried on principally by cooperative programs between State and Federal agencies. Much of this type of program falls within the existing cooperative work between State geological surveys, State conservation departments, State engineering departments, and the Water Resources Division, U.S. Geological Survey. This program is deficient and should be given strong support so that an adequate appraisal of our Nation's water supplies can be made. It should not be interfered with or made competitive with activities sponsored by the Anderson bill.

Basic research carried on mainly by Federal agencies such as the U.S. Geological Survey, the Department of Health, Education, and Welfare, the Agriculture Research Section, U.S. Engineers, and at some universities under sponsorship of research foundations. This program is substantially deficient, and should be given much added support. The Anderson bill is a vehicle for such support at universities.

Recommendation No. 1

The Anderson bill should have as a primary purpose the strengthening of university programs so that adequate master's and Ph. D level curriculums in hydrology are available at many universities throughout our country, and at the same time support specifically associated basic research efforts in connection with these academic programs.

Recommendation No. 2

It is recommended that existing programs of water research, both applied and basic, and data collection between the U.S. Geological Survey and State agencies receive substantially greater support, especially in the applied and basic research aspects of their program, thereby leading to the development of improved methods and tools for studying our Nation's water resources and leading to greater knowledge of the availability, quality, and quantity of these water resources. It is recommended further that the responsibility of the water resources institutes sponsored by Senate bill 2 be specifically restricted from overlapping and duplicating these existing programs.

With regard to the potential danger of overlapping programs as the result of Senate bill 2, legislation proposed in at least one State already, if enacted, would have resulted in the transfer of the basic cooperative water resources research from one group having over 100 years' experience in carrying out water resources investigations to a State university with no such experience.

The future welfare of our Nation is directly related to our ability to develop fully our water resources. Civilizations have risen and fallen because of inability to cope with water problems. Though the technological know-how in the field of hydrology today is much greater than in the past, so are our water problems of today more complex and cover a greater areal extent. The action taken on the Anderson bill by our Congress in support of water resources programs can very well determine the future welfare of our Nation.

During the past 10 years water has been a very popular subject. Most agencies associated even remotely with water have scrambled to develop programs of one type or another. There has subsequently been rapid growth in water resources

programs and, unfortunately, very little close coordination that would result in fulfilling overall water resources program needs. The Anderson bill should not contribute to this deficiency. It will not if recommendations (1) and (2) are seriously considered.

Previous experience: District geologist, Water Resources Division, U.S. Geological Survey, over all of Alabama; division hydrologist, 14 midcontinent States, Water Resources Division, U.S. Geological Survey; Chief, Ground Water Branch, Water Resources Division, U.S. Geological Survey, Washington, D.C.; and Assistant Chief, Water Resources Division; U.S. Geological Survey, Washington, D.C.

Mr. ASPINALL. Does that conclude your statement?

Dr. VERNON. Yes, sir; thank you.

Mr. ASPINALL. Doctor, for the benefit of the record, would you state your qualifications, your education, and so forth, and where you went to school?

Dr. VERNON. Yes, sir.

I received basic training in geology at Birmingham Southern College, graduating there in 1936; basic courses in geology and hydrology at the University of Iowa, graduating there in 1938, with a master's degree and obtained the doctor of philosophy degree at Louisiana State University, graduating there in 1942.

I have been a State geologist of Florida since 1958 and have been on the staff as geologist with the Survey since 1942 or thereabouts, shortly after graduation.

We have had 51 years of research in hydrology in Florida. Our first bulletin was published on ground water resources of the State of Florida.

We have had cooperation with the U.S. Geological Survey since 1939 and much of our energies have been spent in this field.

Mr. ASPINALL. The Chair recognizes the gentleman from Florida.

Mr. HALEY. Mr. Chairman, I do not believe I have any questions to direct to Dr. Vernon. He has made a very fair statement and, of course, I am happy to have him here this morning to give us the benefit of his knowledge and counsel.

However, I might ask you this question, Doctor: On page 4, you say that if a National Research Institute were created and the responsibilities for national research in water were given to those Federal agencies now having missions in this field, yet to create this National Institute will be more or less of a clearing place for a gathering of information place? What would be the function of that institute? Would it mean the creation of another agency in Government?

Dr. VERNON. No, sir; as I see it, it would not mean another agency as such. You could utilize those people already in the field but it goes beyond a clearinghouse because there are great needs for research on specific problems of hydrology at the national level. Many of the States have research programs in their own States at the present time but they are directed to solving problems of the currents and distribution of water in their States.

However, we need to have some agency that has the entire responsibility of looking at hydrology, currents, and distribution, and movements of water upon the national scene, and in the national environment.

It would be my thought that, since the U.S. Geological Survey has been in this field for a great number of years, that such a Research Institute could well be created in that organization.

Mr. HALEY. Of course, I agree with you but one of the things that disturbs me in this particular field—where we have so many agencies of the Government now participating—the right hand does not know what the left hand is doing, so to speak, and to me this is a situation that should be corrected. For instance, you have eight agencies or departments of Government who have many programs and there seems to be no central place where anyone could go and find out what Alabama is doing, what California is doing, or New York is doing, and so forth. That seems to me one of the justifications for the Federal Government legislating in this field, to get some continuity in the flow of information and a place for it finally to be tabulated and gathered.

Dr. VERNON. Mr. Haley, I do not see that any national water institute could function unless it made, as its first duty, some tabulation of the existing data from all of these agencies and from all of the researches that could be made available to them. They would have to weigh this evidence to determine if it is adequate for the needs in many aspects, but, for the most part, I think this would be a function of someone who would have some responsibilities in research at the national level in water resources.

Mr. HALEY. Doctor, you are well aware of the fact we now have about eight agencies of Government in this field and none of them seem to know what the others are doing. We have the Departments of Agriculture, Interior, HEW, Defense, VA, and these various agencies spending a considerable sum of money in this work but they do not seem to have any coordination.

I think that is essential in a program of this kind.

Dr. VERNON. I would agree with you, sir.

Mr. HALEY. That is all, Mr. Chairman.

Mr. ASPINALL. The gentleman from Maryland.

Mr. MORTON. Doctor, to explore that point the gentleman from Florida made, the bill does say in section 104 that it will be the responsibility of the Secretary in his effort to bring his program together to coordinate the research activities.

I am not clear, if I understand your proposal, which is your first proposal, the National Research Institute? Are you thinking here that this National Research Institute will actually carry out the research programs or that they will direct the research programs of the recipients of the funds of this bill? I am not quite clear as to what your thinking is.

Dr. VERNON. I think there are two things that are bothering you and one is that the National Research Institute, as I have recommended it here, would be directed and given the responsibilities for developing data where voids exist now in our hydrologic picture. They might also be given responsibility for coordination or that could be done elsewhere in Interior, or somewhere else. That was not my recommendation.

I was trying to get somebody to be given responsibility for the overall development of the hydrologic picture which the USGS has been doing in some aspects but has never, as I understand it, been given the direct responsibility for developing these facts. They need to create an institute which they could have the right kind of people, the laboratories, and do research in hydrology where voids of information do now exist.

In order to establish where these voids exist, they would necessarily have to know what is being done, it seems to me, first off.

Mr. MORTON. One of the problems, as you well know, that we have in establishing in Government any sort of research activity is a limit of personnel and our ability to attract research people and scientific people into a Government situation as opposed to a private or college situation. There is just not much to offer.

I think the Secretary's purpose here was to take advantage of the manpower pools that did exist, admitting that they are not quite sufficient to do the job, but I was wondering if we could satisfy the weakness you see in this legislation by actually designating some of this compilation of data to an individual institution, such as your own institution, so that we could avoid the necessity for establishing another really independent type of agency for handling this by the Government, and leave it vested in our land-grant college system.

Dr. VERNON. That would be very well, Mr. Morton, if you are talking about State responsibilities, but since water is a national problem, the coordination would be much more exact and beneficial, I think, if we had some sort of national agency that was taking an overall look, doing research in specific problems and not trying to control or manage funds particularly, but who are scientists and engineers and who are actually doing research in problems of hydrology at the national level.

It would take some careful definition, I would realize, but certainly you should not ignore those State agencies who are in the water business.

Mr. MORTON. No; and I think the bill as I understand it really puts the State agencies in the water business to a much greater extent than they are by providing these additional funds.

Mr. ASPINALL. If my colleague would yield?

Mr. MORTON. Yes, sir.

Mr. ASPINALL. Dr. Vernon, what you are saying in your statement is that you are removing the emphasis as far as the land-grant colleges and universities are concerned in this program. You are placing almost the entire emphasis on the national situation, if I understand your statement correctly; is that right?

Dr. VERNON. Mr. Aspinall, I think my testimony would be directed to two points: the university systems ought to be in the business of teaching with strong graduate research programs and fulfill the greatest expressed need, which would be for the development of competent people in hydrology; secondly, it would be that an institute be created at the national level which would have the responsibilities of developing water facts for the Nation.

Mr. ASPINALL. With that in mind, how do you answer the argument made by those representing the universities that they, in their work in the agricultural field, extension, and otherwise, teaching and research, have come up with perhaps one of the greatest records of service in research any government has ever had in this particular field? They think that they can do the same thing if they were given a like recognition in the water field.

Dr. VERNON. I have no quarrel with the universities on that point. I think that they have done a splendid job in agriculture, but the mere fact that they did it in agriculture does not necessarily mean

we have to do the same thing in water, particularly since in every State there now exists a water agency which has been given those responsibilities already by their own State legislatures.

Mr. ASPINALL. That is applied research and has very little to do with the fundamentals of scientific research.

Dr. VERNON. I would say about 20 percent of our program goes into research, sir, of one type or another; academic, if you choose, but much of it is applied. Certainly, there has to be this data development program which is purely descriptive in order to have research.

The universities certainly cannot go out and do the type of work we are doing and do research for the money you are giving them. It would be much easier for us to take this data ourselves and do research on it than it would be to reproduce our files and give it to the universities and allow them to make observations on it. They need to meet the greatest demands and that is a need for teaching personnel.

Mr. ASPINALL. I am not a scientist, sorry to say, but I saw an operation in Colorado State University last August in which the university is directly in charge of something that has greater possibilities in my opinion than any scientific operation I have seen in any of the Western States as far as their application of research is concerned.

I think that is all.

I thank my friend from Maryland.

Mr. MORTON. One other question, Dr. Vernon.

I would like to get at the trained personnel that are available in this particular field.

Do you feel we have a real void in trained and skilled people in the field of hydrology in this country, or do you feel that there are enough people so that if they devote their talents to this, they can adequately meet the needs?

Dr. VERNON. Mr. Morton, I think that this is the greatest unmet need for personnel that exists in the Nation today. A hydrologist is a peculiar animal.

In the first place, there are probably no professionals yet recognized as hydrologists. Generally, a man develops competence in hydrology through some sort of service organization. This may arise out of geology, engineering, or some other fields but in effect a hydrologist ought to be trained for the specific job of studying the currents and distribution of water upon the earth. He must have several disciplines if he is going to be a good hydrologist. He must have some Geology, some engineering, some botany, maybe a little law, meteorology, and several other disciplines.

I think the only way we can get such a man is probably to take him when he first enters college and encourage him to enlist in this program and to take him on into a master's and perhaps a Ph. D. program because these are such diverse sciences.

I think we must get all disciplines of a university, or maybe several universities, into such institutes if they are going to meet the demands for these people.

Mr. MORTON. Thank you very much.

No further questions, Mr. Chairman.

Mr. ASPINALL. The gentleman from California?

Mr. JOHNSON. I have no questions.

Mr. ASPINALL. The gentleman from Kansas?

Mr. SKUBITZ. I have no questions.

Mr. ASPINALL. The gentleman from Oregon?

Mr. DUNCAN. No questions.

Mr. ASPINALL. The gentleman from New Mexico?

Mr. MORRIS. No questions, Mr. Chairman.

Mr. ASPINALL. Dr. Vernon, at the present time, although we have these eight agencies to which the gentleman from Florida has made reference, approximately four-fifths of all the money that is spent on water research is spent by the agencies operating under the Secretary of Interior. We also have the National Science Foundation which has assumed some responsibility, oversight responsibility, for distributing funds for particular projects.

Would it not be possible to work your idea into the structure of government that we have at the present time rather than set up a new agency if the Secretary of Interior saw fit, with the broad power he has, to form a new agency?

Dr. VERNON. Yes, sir. I did not mean to imply that the National Water Research Institute had to be a separate agency in any organization. Actually, the U.S. Geological Survey is doing much of this now but it ought to be clearly spelled out that they should do these things and it is going to require some slightly additional moneys if they are to approach these problems with any kind of success.

I say it could well be placed in existing agencies.

Mr. ASPINALL. Then one other question.

Maybe I misunderstood your statement, but you do not imply, then, or mean to imply by this statement that the research institute which you propose will be a substitute entirely for the college operations?

Dr. VERNON. No, sir. What my statement would be directed to is that the colleges ought to be placed in teaching such allied research as is necessary for a strong graduate program but there ought to be some national look at the problem of hydrology itself in existing agencies.

The USGS, by all odds, has done more of the basic data research-type study than the other Federal agencies to my knowledge.

Mr. ASPINALL. We have had this question before us since I have been in Congress, and I expect before that, as to whether or not we should have scientists hired by the Government as such, or whether or not we should have the scientists working for the Government under contract procedures.

At the present time, we have contract procedures under the saline water program. We have had it in the National Science Foundation program and I expect that we have it in several others.

You would bring these scientists directly into the Federal Government just like, to a certain extent, we have scientists with the Atomic Energy Commission; is that right?

Dr. VERNON. I would simply designate responsibility to those scientists already hired by the Federal Government. I would specifically insist that the universities teach and develop and fill the void of personnel.

Mr. ASPINALL. With the money we provide in this bill to universities, they are not going to do very much except teach. This would about take care of one professor and two assistants operating with a

group of graduate students. That is about all they are going to be able to do.

Dr. VERNON. Certainly, they are going to have to develop laboratories, and nearly all water research has to be a sustained program. If they are going to be successful, I think this has to be true. I have no objection to it being spelled out that way. But it seems to me the bill does not specifically get to the point and the great need that we have felt. That is, the need for personnel. Since the universities are in the business of training personnel, it seems to me this ought to be their primary responsibility with such research as might be necessary for a vigorous graduate program.

Mr. ASPINALL. Thank you very much. I am not arguing against your position. I wanted to be sure I understood it.

Mr. JOHNSON. Mr. Chairman.

Mr. ASPINALL. The gentleman from California.

Mr. JOHNSON. In the work being done now by the U.S. Geological Survey people, who makes the funds available? Are all those surveys federally financed or do States cooperate and assist in financing the programs being carried on?

Dr. VERNON. Mr. Johnson, I would have to answer your question in two parts. There is in existence at the present time a cooperative program between the several States and the U.S. Geological Survey in ground water, surface water, and quality of these waters. These vary somewhat in amount. One-half of that program is provided on the State level and one-half is provided on the Federal level, a matching program.

There are, however, other funds available to USGS appropriated by Congress for specific research in water. There are still other funds that are available through other Federal agencies, made available to the U.S. Geological Survey for the purpose of doing a specific job for, say, a Federal agency. The Corps of Engineers sometimes hires and pays the entire costs for a study of some water problem that they are interested in. So do some of the park services and others.

Mr. JOHNSON. Where are these facilities located? Where is this research carried on?

Dr. VERNON. In various areas, subdivision offices of the USGS, here in Washington and elsewhere, Denver. Of course, the cooperative program is carried on at the State level in the State and the offices are located there.

Mr. JOHNSON. In Federal facilities?

Dr. VERNON. In our own State part are in Federal facilities and we house another branch in our building at no cost to them, the ground water program.

Mr. JOHNSON. None of these programs are being carried on at any universities or colleges?

Dr. VERNON. In the University of Florida and Florida State University I am not familiar that they have any cooperative program with USGS. I think they do not.

They are, however, carrying on some research in water, particularly at the University of Florida, in the chemistry of water and in soil and vapor and evapotranspiration-type studies.

Mr. JOHNSON. That is all.

Mr. ASPINALL. Thank you very much, gentlemen.

Mr. HALEY. A parliamentary inquiry, Mr. Chairman. Dr. Vernon presented a statement.

Mr. ASPINALL. It has been made a part of the record.

Dr. VERNON. Mr. Chairman, Dr. Peoples would like to clarify his position.

Mr. ASPINALL. You may proceed.

Dr. PEOPLES. Mr. Chairman, I come here as one of the committee, of Mr. Vernon's committee of Association of State Geologists. I would come in support of the resolution which was passed and signed by our president, Earl Cook.

It seems to me that the major point of that is that not enough emphasis is given in this bill on the training aspect. I wholeheartedly agree with Dr. Vernon on the problem of getting more trained personnel.

I do not want to extend comments further than this because in my State I represent the geological and natural history survey, which in my State does not have the responsibility for water. I would prefer that any statement from Connecticut come from the water commissioner, who has those responsibilities.

Mr. ASPINALL. Thank you very much.

The next witness will be Mr. John I. Taylor, representing the American Farm Bureau Federation. We are always glad to see you before this committee, John.

STATEMENT OF JOHN I. TAYLOR, ASSISTANT LEGISLATIVE DIRECTOR, THE AMERICAN FARM BUREAU FEDERATION

Mr. TAYLOR. Thank you, Mr. Chairman. Mr. Chairman and members of the committee, I have a short statement I will read most of, but there are parts of it I will eliminate.

Mr. ASPINALL. Your statement will be included in the record as if read in full.

Mr. TAYLOR. The proposed legislation currently under consideration, H.R. 2683, S. 2, and others, is intended to establish water research centers at land-grant colleges and State universities, to stimulate water research at other colleges, universities, and centers of competence, and to promote a more adequate national program of water research.

These bills are a direct result of the studies of the Select Committee on National Water Resources. The recommendation of this committee relative to this subject says:

3. The Federal Government should undertake a *coordinated scientific research on water*. This should include both research into *ways to increase available supplies*, and *ways to increase efficiency* in the use of water required to produce manufactured goods and crops. The committee recommends that existing programs be strengthened by taking the following action:

(a) Expanding the programs of basic research dealing with atmospheric physics, solar activity, hydrology of ground water movement and recharge, the physical chemistry and molecular structure of water, photosynthesis, climatic cycles, and other natural phenomena associated with water in all its forms. Such research is essential to a major breakthrough in such fields as short- and long-range weather forecasting, weather modification, efficient management of underground reservoirs, evaporation reduction, desalinization, and pollution abatement, as well as to major improvements in works for the storage and control of water.

(b) Providing for a more balanced and better constructed program of applied research for increasing water supplies through desalinization, weather modification, and evaporation and evapotranspiration reduction.

(c) Providing for an expanded program of applied research for water conservation. Special emphasis should be given to research on improved waste treatment methods, on ways of increasing efficiency in the agricultural use of water, on fish and wildlife needs, and on methods of system planning for the optimum development of water resources of river basins.

(d) Evaluating completed projects with a view to determining modifications to enable them more effectively to meet changing needs, to provide better guidelines for future projects, and to better determine their effect on the local, regional, and national economy.

The executive branch should be requested to review present research programs in the field of water and to develop a coordinated program of research designed to meet the foregoing objectives. [NOTE: Emphasis added.]

While we do not agree with the premise, "The Federal Government should undertake * * *" and we are aware that these bills do provide a measure of State cooperation, we feel there is entirely too great an opportunity for this to become another Federal or federally dominated program.

The American Farm Bureau Federation adopted the following policies in regard to research at our latest annual meeting held in Atlanta, Ga., on December 13, 1962.

We favor a continued and expanded research program on conversion of saline water, air pollution, water and soil conservation, drainage, forestry management restoration of strip mining areas, and other natural resource problems, within the framework of Federal-State-private cooperation.

The Government must exercise strict economy, eliminate duplication, and promote efficient operations.

The proposals made in H.R. 2683 and related bills are to extend the field of water research to the colleges and universities of the Nation.

We are in general support of the basic objectives of these bills but are convinced that there are not sufficient safeguards to—

- (a) Avoid duplication of effort.
- (b) Get the maximum research done.
- (c) Coordinate the efforts of the Federal agencies.
- (d) Avoid excessive expenditures.

We suggest consideration of the following to strengthen and safeguard these proposals:

1. Both titles I and II provide for grants on a matching basis. The first, "to land-grant college, State university, or other institution of higher education * * *"; the second, "to any educational institutions, private foundations, private firms or individuals, or with local, State, and Federal agencies." We feel such an arrangement would so diffuse the funds that little substantial work could be done inasmuch as every State college would be eligible. We also believe Federal agencies should be eliminated from participating in these funds since they are appropriated moneys directly for this purpose as is shown below.

2. We believe further some system should be devised to coordinate this work as well as the water research which is being done within the several departments of Government. There seems to be too much opportunity for overlapping and duplication both in the proposed program and in those already in operation.

3. We should not assume that work is not now being done in this field. Quite the contrary is true. The following will show some of the agencies now doing work in this field:

*Obligations of Federal agencies for water research and surveys*¹

[In millions of dollars]

Agency	1962 actual	1963 estimate	1964 estimate
Departments of:			
Agriculture.....	11.0	12.3	11.7
Commerce.....	2.1	1.9	2.0
Defense.....	1.8	2.4	3.8
Health, Education, and Welfare.....	8.2	19.0	17.4
Interior.....	17.5	24.8	34.9
Atomic Energy Commission.....	3.7	3.8	4.0
National Science Foundation.....	1.9	1.9	2.0
Tennessee Valley Authority.....	.5	.7	.9
Total.....	46.7	66.8	76.8

¹ Table G-13 taken from the budget for fiscal year 1964, p. 404.

This bill could be used as a means to increase wasted effort in this field because of the lack of qualified personnel. The Senate Report 117 on S. 2 says, "We cannot vastly increase water research speedily if we would. The needed hydroscintists are not available." Therefore, we suggest that this work be confined to our land-grant colleges and State universities where there is good opportunity to train such people.

4. Title III, section 301 provides that this act shall not alter existing water research programs of other Federal agencies; section 302 provides for a "Water Research Service" in the Department of the Interior; while section 303 authorizes funds for administration and the employment of a Director and other personnel. We doubt the advisability of creating another agency within one department of Government.

5. Budgetary matters are always present. We consider research in water resources should carry a very high priority. We suggest, however, that funds allocated to it should be within the framework of a balanced budget.

In summary, we feel this work is important and should be done; that some of it should be assigned to our colleges and universities; that funds should not be so diffused as to promote wasted effort; that in our institutions of higher learning is the place to train technicians which are so urgently needed and it should be done in cooperation with people closely associated with enforcement problems in the States. We see no need to allocate additional funds under this act to agencies already operating under other acts or for the creation of a new agency which, by the terms of this bill, could not coordinate all the work being done currently in water research.

We appreciate the opportunity to appear before this subcommittee and express our views. We hope our suggestions will receive favorable consideration.

Mr. ASPINALL. Thank you, John. As usual, you have presented a very precise and clear statement.

It so happens we have a statement here following the statement of Dr. Vernon, which pretty well sets up the other side of the picture. We are glad we had these two papers together. The gentleman from Florida.

Mr. HALEY. I have no questions, Mr. Chairman. I do want to compliment the gentleman for his brief and to-the-point statement.

Mr. ASPINALL. The gentleman from Kansas.

Mr. SKUBITZ. Mr. Taylor, do you feel that perhaps what we ought to do first is to coordinate the programs we have now in effect, look over the things we have done, determine where we are going before we pass this sort of legislation?

Mr. TAYLOR. I would think this would be sound judgment, Mr. Skubitz.

Mr. SKUBITZ. Thank you.

Mr. ASPINALL. The gentleman from New Mexico.

Mr. MORRIS. Mr. Taylor, how would you suggest we do this? First you suggest what I take to be some interest in changing the bill, that we confine the research money to State universities and land-grant colleges instead of other institutions of higher learning. Second, as I understand it, you suggest that we devise some system to coordinate this work and research done in other Federal agencies.

I thought that is what I was trying to do in title 3 of section 300, in the general provisions, coordinate not only this but the work of all agencies through the Department of the Interior.

Mr. TAYLOR. I did not so interpret it, Mr. Morris. You could be right. I interpreted this to be a committee within the Department of the Interior to coordinate that work, but by the terms of the bill itself, if you will note under section 301, title 3, it provides that this act shall not alter existing water research programs of other Federal agencies. Therefore, a committee set up in Interior by the terms of this bill could not have anything to do with the programs in other agencies.

Mr. MORRIS. Mr. Taylor, I have not been in the Congress very long, but I have found that when you get into the jurisdictional fields of various Federal agencies, you cannot just go in and do a perfect job at one time. You have to take it step by step.

I thought perhaps a first step we could take would be to try to get some kind of coordinating agency, an agency where we could go to get information on what all other agencies were doing in this field. Then perhaps gradually move into the other, take the other step, which would put a little teeth in how these programs get started. This is what we started out to do with the Outdoor Recreation Bureau. The first thing I feel you have to do is get a starting point somewhere.

Mr. TAYLOR. I believe so.

Mr. ASPINALL. If my colleague will yield—

Mr. MORRIS. Yes.

Mr. ASPINALL. My colleague is aware that the chairman of the committee requested the President of the United States to take care of this coordination. The President does have his committee and is finding it rather difficult to get the answers to all this.

As I see what your bill does, it does provide coordination within the Department of the Interior but at the same time there is provision to take care of this shortage of personnel we have in this particular field.

Mr. MORRIS. At least, this is what the objective is. It may be that this bill needs some extensive revision and repair.

I feel that the only way you can train a research hydrologist is for that hydrologist to do research. There may be other ways of training; I do not know. The best system, I think, of training a researcher is in doing the actual research in which he might be getting his advanced degree or a project he is working on.

I certainly have no pride of authorship as to language of the bill. I do not feel from reading your statement, Mr. Taylor, that the bill as far as the principle goes—it seems that you agreed to the principle——

Mr. TAYLOR. True.

Mr. MORRIS (continuing). Of the need for training of the personnel.

Mr. TAYLOR. Yes.

Mr. MORRIS. I perhaps have some question about the Department of Interior getting a little extra money for a little extra project they want to set up. In the process of getting something established, you have to compromise with people whose views may not be exactly the same as yours. I appreciate very much your statement. I think it is a good one.

Mr. TAYLOR. Thank you.

Mr. ASPINALL. The gentleman from Maryland.

Mr. MORTON. No questions.

Mr. ASPINALL. The gentleman from California.

Mr. JOHNSON. No questions.

Mr. ASPINALL. The gentleman from Texas.

Mr. ROBERTS. No questions.

Mr. ASPINALL. The gentleman from Oregon.

Mr. DUNCAN. I want to underscore what the gentleman from New Mexico said. In glancing through the bill, S. 2, it seems they have carefully couched the terminology thereof in an effort to emphasize the coordinating aspects and eliminate the duplication.

For instance, in the case of grants in section 100(a) they are expressly limited in lines 12 and 13 on page 3 to water research, where it says that they must coordinate and they must have due regard to water research projects being conducted by agencies of the Federal Government and those related to agriculture being conducted by agricultural experiment stations.

I find over on page 4 that the grant in section 100(a) is limited to research projects in line 1 which could not otherwise be undertaken, including the expense of planning and coordination.

Then I find further over on page 7 that the Secretary of the Interior, one of his prime jobs is to participate in the coordination of research initiated under this act by the State agencies.

Then on page 9, in title 2, again the Department of the Interior, the Secretary is admonished to limit them to projects not otherwise being studied.

Then, as Mr. Morris pointed out, the whole title 3 seems to me to be couched in terms that would limit the additional projects to those that will supplement and not duplicate established water research programs. This is lines 10 and 11.

There are provisions in lines 17 through 23 for the classification and the coordination, reporting by other agencies to the Secretary of the work that is being done.

I would just like to ask what additional language you would suggest be added to this bill that would insure against the fears that you have expressed here this morning of duplication and waste.

Mr. TAYLOR. Mr. Duncan, you raise several points which are quite well taken. I made a few notes yesterday. I cannot answer definitely on each point, the language that I would use.

I notice the notations following the amounts of money that the Federal agencies are getting now, in the discussion of what these moneys were used for currently and what they had in mind for the future.

It was just a little bit amusing to me to note that of these agencies which are now in this field, they list in several categories various projects on which they are working with no relation to any other.

If this bill does provide, which we do not see at the moment, for a coordination of those efforts and in coordination with those that go to colleges and universities, then that is fine.

Mr. DUNCAN. I think the provision in title 3 for at least an annual reporting to the Secretary of the Interior of all work these other agencies are doing is a step in that direction. I am sure that is one of the things the author of the bill had in mind. I do not think there is any major disagreement as to the purpose. The only point is: What can we do to strengthen the bill even more along these lines? I thank you.

Mr. ASPINALL. If my colleague will yield——

Mr. DUNCAN. Yes.

Mr. ASPINALL (continuing). Mr. Taylor is taking the position that his organization always takes. It is a good program but do not blow it up too much.

Mr. TAYLOR. That is right.

Mr. ASPINALL. We all accept and appreciate that. I doubt if he has any particular language at this time, but certainly his statement should cause us to be a little careful about the language we finally adopt. Thank you very much, Mr. Taylor.

Mr. TAYLOR. Thank you.

Mr. ASPINALL. The next witness will be Mr. Sam Thompson, member of the Executive Committee of the Council of State Governments, Interstate Conference on Water Problems. He will be accompanied by Dr. Mitchell Wendell, counsel for the council. It is always good to see you in the room, Sam. Glad to have you accompanied by Dr. Wendell.

STATEMENT OF SAM THOMPSON, MEMBER, EXECUTIVE COMMITTEE OF THE COUNCIL OF STATE GOVERNMENTS, INTERSTATE CONFERENCE ON WATER PROBLEMS; ACCOMPANIED BY DR. MITCHELL WENDELL, COUNSEL TO THE COUNCIL

Mr. THOMPSON. I am Sam Thompson, chairman of the Mississippi Board of Water Commissioners and a member of the Executive Committee of the Interstate Conference on Water Problems. I also have the honor of being past chairman of that conference.

The Interstate Conference on Water Problems has followed S. 2 with interest ever since its introduction, and indeed even earlier, when the idea of a water research bill was being talked about both in and

out of governmental circles. As an organization of State officials having responsibilities in water matters, we are naturally interested in efforts to improve knowledge in the field of water resources.

When S. 2 was before your counterpart committee in the Senate we appeared in support of the objectives of the bill. Since the basic provisions of the legislation and most of the detail remain the same as they were in the bill as originally introduced in the Senate, the observations we made before the Senate committee are still in point. Consequently, the major portion of this statement is the statement made by me on behalf of the interstate conference at that time. However, before coming to the ground traversed in our Senate statement we should like to discuss some of the amendments made to the bill in the interval between our earlier testimony on it and its passage by the Senate.

One of our concerns with this legislation is that it should give the States as much flexibility as possible in taking advantage of already existing or embryo research organizations or programs connected with governmental entities. There is a great shortage of trained talent in the water research field, and it is important to utilize to the full and to strengthen existing capabilities, rather than to duplicate agencies and programs. An amendment to section 100(a) added before Senate passage and appearing on page 2 lines 21-25 of the bill before you is helpful in this regard. It clarifies the provisions of the legislation so that a State's ability to use one or more of its existing educational institutions, public or private, in participating under this statute would now be specifically recognized.

On the other hand, there now are some water research programs conducted by State agencies other than colleges or universities, and there well may be more such programs in the future. It would be desirable to introduce this further degree of flexibility into the legislation by adding language that would permit a State to use such an agency as the nucleus of an institute, where appropriate.

We also note that the bill as it passed the Senate strikes the original authorization for the creation of a water research service. We have no specific comment on this change because it is a matter of internal administration for the Federal Government which does not seem to have any particular implications so far as relations with the States are concerned.

As indicated above, our position is the same as that presented to the Senate committee earlier this year. Accordingly, we wish to quote that statement and make it part of this testimony, as follows:

This Interstate Conference on Water Problems is a national organization of State officials concerned with all phases of water resources planning, development, use, and administration. Consequently, the conference is vitally interested in the improvement of water research programs and in legislation designed for this purpose. We appear in support of the objectives of S. 2 and wish to offer the following observations on the problem to which it is addressed, and on certain of the bill's provisions.

With ever-increasing demands on our water supplies, the need to have complete information concerning our water resources and the most efficient means of using them grows. For the Nation as a whole, it seems unlikely that we will have an actual shortage of water in the predictable future. However, a usable abundance depends on proper distribution of the available supplies of water, upon optimum management of the supply, and upon constant improvement of techniques for using and reusing water. We have learned a great deal about hydrology and other water resource matters, but in important respects our information and know-how are still inadequate.

Essential to any program of water resources research is basic data collection. No program can be any better than the raw material it has to work with. Basic data collection has been carried on by the U.S. Geological Survey and the States on a cooperative basis, with matching funds and close cooperation of Federal and State personnel. It is our understanding that the research authorized by S. 2 would be in addition to, and not in substitution for or replacement of, the cooperative basic data collection program. Continuation and expansion of the existing program is of the first importance, and it would not be wise to sacrifice or impair it in order to devote funds and personnel to some other type of effort. On the other hand, provision for broadened water research programs, while safeguarding the continued development of the existing cooperative Federal-State program, would be very worthwhile.

The idea of State or regional institutes connected with colleges or universities is a good one. Despite the fact that much of the results of research will be applicable throughout the country, many of the physical aspects of the contemplated research must be undertaken in the geographic areas concerned. Also regional variations in water resources problems can be better reflected by State or regional institutes than they could be by a single consolidated facility, however excellent. We are especially glad to note that the bill expressly recognizes that either land-grant colleges or other institutions of higher learning could be the appropriate location for research activities of the types contemplated, and that each State is given an opportunity to decide where its institute would be lodged.

In this connection, however, the bill could give greater recognition and prominence to existing public and nonprofit water research agencies. Some of them are attached to State or private universities. Others exist as nonuniversity connected departments, boards, or commissions of State government. While the facilities of a college or university are highly useful for research activities and will strongly impel States to locate the institutes provided by this proposed legislation on university campuses, the objective of the bill is to promote water resources research in whatever way is most efficient. Consequently, we would suggest that the committee consider modifying the opening language of section 100(a) so as to permit the operation of institutes in States under any suitable administrative pattern, particularly where a nucleus of competence or a material volume of research data are already available. Several conforming changes would have to be made in the title and other parts of the bill if this were done. Emphasis could still be placed on colleges and universities by mentioning them specifically as among the suitable locations for the research work.

Also, we wish to commend the sponsor and supporters of the bill for making express provision for States to establish joint facilities on a regional basis. In particular instances a State may find it most suitable to have a research facility whose territorial service area is coincident with the boundaries of the State; in other circumstances, larger service areas—perhaps a river basin or group of river basins—will be more economic or convenient. Encouraging States to engage in cooperative undertakings, wherever appropriate, without penalizing them financially for doing so is a constructive approach.

The problem of effective use of research funds and personnel has another aspect. The language of the statute should provide means for avoiding duplication of research activities, both as among institutes in the several States and among institutes and other Federal and non-Federal research agencies. In addition to the notice already taken of this problem in the bill, we suggest that the statute might provide for a committee of officials from States participating in the program with which the Secretary could confer in order to shape the various parts of the research activities carried on pursuant to this legislation in ways that would make them complementary, rather than duplicative, but without imposing restrictions on initiative to devise and execute research.

At its December 1962 meeting, the Interstate Conference on Water Problems adopted a resolution dealing with water resources research. That resolution is appended to this statement. If the Interstate Conference on Water Problems can be of any assistance to the committee in the further development of this legislation we will be happy to cooperate with you.

We wish to thank you, Mr. Chairman, and the members of your committee, for the opportunity to express our views on this important legislation.

Mr. ASPINALL. Thank you very much, Mr. Thompson.

Without objection, the resolution to which reference has been made will be made a part of the record also.

(The resolution follows:)

FIFTH ANNUAL MEETING OF THE INTERSTATE CONFERENCE ON WATER PROBLEMS,
DECEMBER 4-5, 1962

I. WATER RESOURCES DATA COLLECTION, EVALUATION, AND RESEARCH

Whereas the Federal-State cooperative program of hydrologic data gathering has been of major significance in the development of information regarding the Nation's water supplies; and

Whereas a strengthening and expansion of the present program is essential to obtain information necessary to take the steps that will be needed to develop water supplies to meet increasing demand; and

Whereas a review of hydrologic data gathering in the States is needed to determine what strengthening and expansion of the present program will achieve the most desirable results; and

Whereas related evaluation and research activities should receive increasing attention as part of an overall water resources program: Now, therefore, be it

Resolved, That the Interstate Conference on Water Problems through its executive and other appropriate committees offer its assistance and counsel in the evaluation of current hydrologic data gathering programs and the determination of future needs; and be it further

Resolved, That with prior regard for the needs of the cooperative Federal-State hydrologic data gathering program, financial support also be recognized as needed for related evaluation and research activities.

* * * * *

Mr. ASPINALL. The gentleman from Florida.

Mr. HALEY. Mr. Thompson, this question is probably a little bit away from the purpose of the bill, but at the moment there is considerable research activity carried on by private industries, is there not?

Mr. THOMPSON. Yes, sir.

Mr. HALEY. Would the passage of this bill in any way, in your opinion, discourage further participation by private enterprise in this problem?

Mr. THOMPSON. No, sir; I think it would further encourage it. If I might illustrate, at one time I was recruiting and training life insurance salesmen. I would much rather try to sell a man who has \$50,000 life insurance additional coverage than try to sell a man who has none at all. I think further activity by the Federal Government in this field would further encourage private industry to continue and expand work on its problems.

For instance, in Richmond at one of our meetings we had a full day devoted to water research when people from the chemical industry, from the paper industry, and from the textile industry were present. It was amazing to people in the State to find out how much these industries had done to reduce the amount of water required to manufacture their various products. A tremendous amount of work is being done by industry. I do not think this would discourage it. I think it would encourage it.

Mr. HALEY. I know there has been tremendous activity by private enterprise, of course, simply because it is a problem that they have to face. For example, in my home State of Florida in the phosphate industry, where a tremendous amount of water must be used, the vari-

ous phosphate companies down there have made right sizable expenditures in the study and research of water problems.

If this legislation is passed, I wonder what we could do to encourage these private corporations and so forth to put their knowledge in the pot, so to speak, so that everybody would have the benefit of it? Would you have any suggestions along those lines?

Mr. THOMPSON. I think if those institutes are set up in the States in connection with the colleges and universities, they will be conducting seminars and bringing in speakers and holding them where water industry people can come in and lay out their problems and give their ideas so that the program can be fitted into the needs of the State. I think so long as industry is subject to water pollution legislation, that industry will continue to spend money over and above the amount provided because they have a personal responsibility that could get involved in their financial operations. I think there will be very close working relationships between industry and these institutes.

Mr. HALEY. I think any information that could be accumulated here, from whatever source, would be something desirable. On the other hand, as you well know, Mr. Thompson, some of these corporations have just a little hesitancy in getting involved in any Federal, or in many instances State, programs. They do not want the Federal Government looking over the shoulders and they do not want people in the State looking over their shoulders and finding out, too, about what they are doing in their own business.

It just struck me that with the tremendous amount of work that has been done by private enterprise, that if there were some way to encourage them to participate in a program of this kind it would be highly desirable.

Mr. THOMPSON. I think there are many colleges and universities engaged in a substantial amount of programs in research in water and other fields where industry is financing the program in order to try to bring the best brains available to bear on the problem. I think once you get a program going and get the trained personnel, that industry will expand its water research program and make greater contributions toward solving the problem.

Mr. HALEY. I would hope that would be true because I think everybody has a problem here and should have some interest here, and anything we could do to encourage private enterprise to put in their knowledge in the general field would certainly be very helpful.

One of the things that has disturbed me is that we have so many various programs and there does not seem to be any coordination or any one place where, for instance, you could go and find out what other people in the Nation or in the various agencies of the Government are doing. They all seem to be on their own and it is certainly desirable, in my opinion, to have one place to go and find out what everybody is doing.

That is all, Mr. Chairman.

Mr. ASPINALL. The gentleman from Kansas.

Mr. SKUBITZ. No questions.

Mr. ASPINALL. The gentleman from New Mexico.

Mr. MORRIS. No questions.

Mr. ASPINALL. The gentleman from Maryland.

Mr. MORTON. No questions.

Mr. ASPINALL. The gentleman from Texas.

Mr. ROBERTS. Mr. Thompson, did I understand from your testimony that you feel under this legislation more than one school could qualify for the maximum? Do you feel more than one could qualify for the maximum or would it have to be split up?

Mr. THOMPSON. It would have to be split up if it is divided. It could all be used in one institution or if the money would produce more research by dividing it, it could be divided.

Mr. ROBERTS. But the maximum would have to be for one State regardless of how many schools participated?

Mr. THOMPSON. Yes, sir.

Mr. ROBERTS. Would you consider it proper to have the State appropriate new funds for matching purposes, or would you allow them to use facilities and make it a grant? In other words, if you allocate it to the school they can charge for space and so forth and actually it amounts basically to a grant. Would you allow the States to set up new money and allocate to the university matching funds?

Mr. THOMPSON. I do not know that I would necessarily require matching funds on any particular basis, but I think it would be well and that the States will provide additional funds to go along with these.

Mr. ROBERTS. If we handed this as a package to the school doing the research, would we not get more out of it?

Mr. THOMPSON. In some cases that might be so and in others it might prevent you from having an institute.

Mr. ROBERTS. If the State is not willing to go along with it, are we not putting our money in a rathole, if it is not worth it to a State?

Mr. THOMPSON. I can visualize States that would not want it. I think Dr. Wendell could comment on that.

Dr. WENDELL. The State contribution and the State demonstration of willingness to participate may in many States be most logically channeled either through the State college of agriculture or the State university or some other educational institution. But I think you are making a mistake if you assume a particular State was unwilling to cooperate or participate because it did not happen to be organized to handle the program in this particular way.

It might very well be that a particular State had a strong research activity in another agency rather than the university and its failure to participate might be due more to the administrative type of restriction that the bill imposes by limiting it to a college or university rather than to a substantive lack of interest. Of course, there might be States where there would be such a substantive lack of interest and if Congress in those instances wished to restrict its program in the way of matching or State participation, that is something for Congress to consider.

Mr. ROBERTS. You almost answered my next question, and that is: If there is an existing State agency for the purpose of water resource development, should this program be channeled into or coordinated by that State agency?

Mr. THOMPSON. I think this would be a matter for the State to make a determination in order for it to best meet its needs. I do not think we should in this law say to a State it has to abandon an agency that is now doing an excellent job and go to an institution of higher

learning in order to do the job. The State can now make a determination under the language changed from the version you now have and the one introduced in the previous Congress, where the State can make a determination and divide its funds among several institutions or agencies to get the job done within a State. Again, I think these should be supplementary funds to what the State is now doing.

Mr. ROBERTS. They could go outside the land-grant college through a State agency?

Dr. WENDELL. The bill with the amendment put on in the Senate goes far enough to permit maximum freedom in the combination of educational and State institutions in a State. It does not go further than that. We are suggesting you might want to consider making the bill go further than that to take advantage of these nonuniversity but still governmental research programs where they presently exist or in the future might be created.

Mr. ROBERTS. That is all.

Mr. ASPINALL. The gentleman from Oregon.

Mr. DUNCAN. There are States, I take it, where research programs are being carried on outside of educational institutions?

Mr. THOMPSON. Yes.

Mr. DUNCAN. That is all.

Mr. ASPINALL. The gentleman from Hawaii.

Mr. GILL. Would it be possible to arrange this program to allow the State university to subcontract to any State agency doing water research at the present time?

Dr. WENDELL. That would be one way of doing it. I think the question of policy your question raises is whether Congress wishes to make the decision or whether Congress wishes to permit a State to make the decision as to how the coordination is going to be done. If the bill continues to suggest that the Federal Government will pay only college and university programs in this particular field, then pretty much the Congress has made the decision that such coordination as exists must be through the State or private university within the particular State.

If, on the other hand, you dodge this decision by permitting the State itself to make the designation within the State, then it may very well be that because of the particular administrative restrictions of the State or where the State has decided to have its major water research program, that the State might pick out a coordinating center something other than a college or university. In many States it would be done one way and in other States another way for local reasons.

Mr. GILL. I wonder if you think, under the language of S. 2, there is enough flexibility to allow the land-grant college designated to subcontract or participate with nongovernmental agencies in the State?

Dr. WENDELL. I do not see anything in the bill to prevent it. I do not see anything in the bill that particularly mandates it. I do not see anything in the bill that would raise any particular question as to contracting it out.

Mr. GILL. One other question: Do you see anything in the present draft of S. 2 that would prevent an institute of this sort at a State university from accepting private money to do specific research on some specific water problem? For example, if you had a papermill with a pollution problem, would it be permissible for it to contract

with an institute for research on law to solve its particular problem?

Dr. WENDELL. I think the bill is sufficiently silent on that type of question so that the rules and regulations of the Secretary administering grant funds under this particular legislation might have a great influence on answering your question. It seems to me, because of the silence of the bill, that the Secretary might be able to produce rules and regulations that will be either friendly or raise more difficulties for the type of thing you suggest.

Mr. GILL. Is there anything wrong with that type of arrangement?

Dr. WENDELL. The Interstate Conference on Water Problems has taken no position on that one way or another. I do not see anything wrong with it. I think it would indicate one particular policy route you could follow.

Mr. ASPINALL. I think counsel has a question.

Mr. McFARLAND. Again in reference to the question of flexibility, I understand you propose flexibility in section 100(a). Section 100(b) is designed specifically to help the States; section 100(b) provides matching funds.

What you are asking for is grants to the States without the requirement for matching funds. Is that correct?

Mr. THOMPSON. No.

Mr. McFARLAND. What is your position, then, with regard to section 100(b)? Does not that provide what you are asking for?

Dr. WENDELL. It does only if you consider that somehow you have two separate programs going here, one of them a set of water research institutes in States that are going to be managed in one particular way, and then other programs under section 100(b). We question whether really you want to conceive of this in terms of that much duplication. We would hope that somehow there could be coordination between section 100(a) and section 100(b) and basically we could be talking about the same type of consolidated water research program under both sections, and certainly complementary ones.

Mr. McFARLAND. That is all.

Mr. ASPINALL. Mr. Thompson, you have been in this water business a long time. You know that we authorized a modest program to start out on saline water research and demonstration plants and in the last 2 years we boosted it up to \$75 million.

This bill contemplates for the first 5 years somewhere between roughly \$50 million and \$55 million, then there is no end after that. Do you feel we should provide in this bill for review or should cut off the appropriation after 5 or 6 years so that a review would be necessary?

Mr. THOMPSON. I believe that the good judgment of the Congress, exercised through the Appropriations Committees in studying this, plus the whole Congress in financing the program, would be better than to put in a stopping point to stop and take a look at it.

If I might illustrate, I am a farmer and have farmed all my life, and I remember back before the days of fertilizers where we could make a quarter of a bale of cotton on an acre. Then we discovered nitrogen and got up to one-half a bale of cotton per acre, then by using more nitrogen we now get 2½ bales of cotton per acre. I think whatever you need, you need to apply the resources to it to get the answer, and I do not think we should put any restriction on it or

say how much nitrogen to put on. You have a governor on an automobile to control the motor. I would hope Congress would provide the necessary restraints so that where we need it we could have the proper program.

Mr. ASPINALL. Thank you very much.

We will now hear from Mrs. Haskell Rosenblum, from the League of Women Voters of the United States.

Mrs. Rosenblum, we are glad to have you.

STATEMENT OF MRS. HASKELL ROSENBLUM, A DIRECTOR OF THE LEAGUE OF WOMEN VOTERS OF THE UNITED STATES

Mrs. ROSENBLUM. Thank you very much, sir.

The League of Women Voters is glad to have this opportunity to express support for the Water Resources Research Act. We believe that if this proposal is enacted, it will give great impetus to the search for solutions to the problems of developing and managing the Nation's water resources. This committee recognized the necessary role of the Federal Government in research when it played a major part in developing the far-sighted saline water program some years ago. We believe that the legislation now before you carries forward and develops further the principle you endorsed in that program.

Recently the U.S. Chamber of Commerce stated:

* * * we need a more scientific basis on which to determine the character and level of pollution in terms of different uses of water.

We need to know more about the current quality of the Nation's waters; the effects of pollutants on people and on the economy; the determination of levels of tolerance; and the development of technical and economical measures to avoid or reduce pollutant content in water.

The need for continuing research in the water field is a fact accepted by almost everyone with any interest or knowledge of the field. We need to know more than the answer to water quality problems. We need to know the answer to problems as basic as the structure of the water molecule and to the problems as complex as how to adjust to competing needs for water use between the pressures of our growing population and our growing economy. In addition we must have trained personnel to plan and administer programs for water development and use. At present there is a scarcity of competent experts. We must therefore find a way to interest more young people to seek career opportunities in this field.

The League of Women Voters of the United States has interested itself in national water matters for the last 7 years. As it has become more and more familiar with local and State water development problems, as well as those at the Federal level, the league has found gaps in knowledge which can only be met by research. League members have also become aware of how difficult it is to find trained personnel at all three levels of government.

Basic research and major technological advances lie beyond the resources of the private water companies, usually small in this country, and the local governments which usually render sewage disposal and waste treatment services. In water development, as in earlier days in agriculture, only investment of government funds will reveal the secrets hidden from us as we follow old methods of supplying irriga-

tion water and treating sewage. The use of Federal grants as incentives for the establishment of water research institutes where programs of great scope and diffuseness could be carried on seems to us to be appropriate.

We think that building up the States' role in water development will call attention to the lack of skilled men and women in this field. The first step to remedy this situation is to recruit enough beginners so that, after the usual attrition, there will be candidates to fill State as well as Federal water jobs. Young people in our universities will learn that there are opportunities for engineers, scientists, economists, administrators, writers, public relations specialists in the water field. The concern and enthusiasm of professors are frequently the inspiration for their students.

One other advantage of having a water research institute in every State, or in neighboring States where efforts are pooled, will be the close association of laymen and specialists with professionals who are acquainted with local conditions. Citizens and officials are accustomed to turn to their university or college for help which fits their situation. No national trouble-shooting agency can give such specially applicable service.

The League of Women Voters has long thought that engineering skill in handling water exceeded ability to make political decisions about water. We should know, rather than guess, what uses are most profitable for the local, regional, and national good. We should also know whether the most profitable uses are also the most desirable. For this we need water-oriented economists, lawyers, political scientists, and experts in public relations. The water development planner and administrator of the future must understand the art of working with citizens as well as the science of hydrology. The university-based water institute is the answer to this need.

Research on water will serve many purposes, have great diversity, be divided in many parts. What has been done in one place will be repeated in another by different men and women checking the validity of the principle and its applicability under differing conditions. We think this committee recognized the multiple principle in research, when it established the saline water stations in many places, with diversified research carried on by the Government, private companies, and colleges.

We have read that after the program which would be established by the bills before you today is all totaled up 5 years from now, the annual cost of its operation is estimated at 11 cents per capita per year. This seems a worthwhile investment. We are hopeful that such a system of research and development for water will be as successful as that of the program for agriculture carried out through the Agricultural experiment stations.

Thank you for giving us this opportunity to appear before this committee.

Mr. ASPINALL. Thank you very much, Mrs. Rosenblum.
The gentleman from Florida.

Mr. HALEY. Mrs. Rosenblum, I want to compliment you for representing a fine organization and for your statement here this morning. There is only one part of your statement that I would disagree with and that is when you state that the research that we need to do lies

beyond the resources of the smaller communities and local governments. If that is true on the local level and State level, it would also be true on the national level because, after all, the Federal Government has no money other than the money it takes from its citizens for the various programs. I think in many instances States and local governments are in much better positions financially to stand the cost of some of these programs than is the Federal Government. After all, as I have said, the Federal Government has no money other than what it takes from its citizens, so any time you say a program is beyond the resources of local government, it certainly is beyond the resources of the Federal Government, because the Federal Government takes it out of the local communities in order to bring about the solution of problems through these various programs.

This is a program that is needful but I believe my great State of Florida today is in better shape financially than the Federal Government. We happen to have a little better than 5 million people in the State of Florida and we do not have any State bonded indebtedness. The indebtedness of the Federal Government is between \$305 and \$309 billion. I do not see where the Federal Government is in such good shape financially.

That is all, Mr. Chairman.

Mr. ASPINALL. The gentleman from Kansas.

Mr. SKUBITZ. No questions.

Mr. ASPINALL. The gentleman from New Mexico.

Mr. MORRIS. I would like to ask Mrs. Rosenblum a couple of questions, Mr. Chairman.

Mrs. Rosenblum, on page 2, line 4, of your statement you say :

The league has found gaps in knowledge which can only be met by research.

Can you list those gaps in knowledge which the league has found?

Mrs. ROSENBLUM. In a number of instances the basic geological and hydrological research needed to estimate accurately the flow in order to construct a dam is quite inadequate.

Mr. MORRIS. Can you name a dam that has been constructed where they lacked adequate hydrological data?

Mrs. ROSENBLUM. I would not like to say for sure, but I know the basic research in the Potomac Basin, for example, has many gaps and yet the Corps of Engineers went ahead on the basis of the data they now have to make plans. I suppose by the time the completed plans for the dam come along they will have more data.

There are other questions, such as the question of whether there are suitable alternatives to a dam, which are not usually proposed. This is a gap because the data on the economics are not adequate.

Mr. MORRIS. You are saying our whole system of the construction of dams and reservoirs is based on inadequate engineering, economic, and scientific information?

Mrs. ROSENBLUM. No, sir. The engineering knowledge is always very great, I would think. Sometimes the economic factors are not always completely understood. I am not saying "always" and I am not attacking all dams, sir.

Mr. MORRIS. You are the one who made the statement. I asked you to point out to me some of these gaps in knowledge which you men-

tioned, and I would like for you to tell me which ones. You mentioned the Potomac River.

Mrs. ROSENBLUM. Yes.

Mr. MORRIS. Is it the hydrology of the Potomac River that you think has not been studied sufficiently?

Mrs. ROSENBLUM. They do not know a great deal about the underground flows. They have had studies of the actual flow of the river with gaps. There is some of the geology itself that I have heard the Department of Geological Survey say they have not had the opportunity to do as much research as they would have liked previous to the preparation of the corps plan.

Mr. MORRIS. On page 3 of your statement, too, you say:

The League of Women Voters has long thought that engineering skill in handling water exceeded ability to make political decisions about water.

Could you tell me what you mean by that sentence?

Mrs. ROSENBLUM. Since I live in the Washington area may I use the Potomac for a specific illustration?

Mr. MORRIS. Certainly, keeping in mind that this legislation is not designed to specifically study the hydrology of the Potomac River but this legislation is designed to provide a national program for all water.

Mrs. ROSENBLUM. I understand, and we are supporting such legislation. Actually, I do have data at the office. This statement was prepared on the basis of information the league all over the country sent in. In order to make the statement short I condensed the information, stating it in general rather than making it specific. California felt there were gaps in knowledge. They said so before the Senate Select Committee on Water Resources. But we do believe that one of the difficulties in research is that the efforts are sometimes on one phase of basic research. It is sometimes the feasibility of the storage that dams can provide and ways of preventing evaporation, and so forth, but not on whether or not there are alternatives to water use that might be the basis of making a decision. For example, do we want irrigation in certain areas or do we want the water to go to cities? This requires economic research.

Does this make it clear?

Mr. MORRIS. I cannot recall any legislation this committee has considered where there has not been a decision made on the use of water for irrigation and the use of water for defense, and the use of water for other purposes. It seems to me these decisions are made just as rapidly as the engineering feasibility findings are made.

Mrs. ROSENBLUM. We are simply asking that in the training of the water hydrologists that they take a really broad view of all the aspects of science, and that means in the humanities as well as other aspects, and we think this can be provided by having them at college-based research institutes.

Mr. MORRIS. That is all.

Mr. ASPINALL. Any further questions?

Thank you very much, Mrs. Rosenblum.

Mrs. ROSENBLUM. Thank you.

Mr. ASPINALL. Is Dr. Spencer M. Smith in the room?

STATEMENT OF DR. SPENCER M. SMITH, JR., SECRETARY, CITIZENS
COMMITTEE ON NATURAL RESOURCES

Dr. SMITH. Mr. Chairman, my apologies for not having a prepared statement.

Mr. ASPINALL. How long are you going to take? We are past adjournment time.

Dr. SMITH. About 5 minutes, sir.

Mr. ASPINALL. Make it 3.

Dr. SMITH. I am Spencer M. Smith, Jr., secretary of the Citizens Committee on Natural Resources, which is a national conservation organization with headquarters in Washington, D.C.

Very briefly, we have been concerned, as the chairman and many members of this committee are, about water resources in their entirety for a long time. We have several considerations about the existing bills that are before this committee. We could not help being reminded, however, in the release, quoting the chairman:

I would like to know what the present research programs were accomplishing and what was being undertaken before final consideration of these measures.

I might add we also would like to join in this because we have been very much interested in what is happening in saline water research and many other facets of the program. Many organizations and branches of the Government have some specific duties to perform and there is no place, to the best of my knowledge, at the present time where this information is coordinated. This becomes evident when we seek answers to specific questions. For example, what is the cost of 1,000 gallons of water in saline treatment? Has saline treatment been used to prevent antipollution measures? And a variety of other matters.

We bounce back between the Department of Health and the Department of the Interior and occasionally the Department of Agriculture. I think the features of this bill that would provide coordination are excellent and we support basically assistance to land-grant colleges.

Mr. Chairman, I never knowingly have lied to your committee. I have been a member of four land-grant-college faculties in my checkered career, if you will, and I must say I have taken part in some research activities that have been excellent and useful. I have also taken part in some research activities that really did not have much chance to get off the ground. I would hope that any legislation supported by your committee would provide careful review of research, research projects, the possibility of attaining the goals, and a variety of other things I think any research person should be apprised of. It is awfully easy in this day and age to say we need more research. We do need more research but we need more quality research. It is easy to pour money down the drain for research that is not quality research. So while this is needed, I think everybody has a real responsibility to make sure that it is research that will be well directed and well managed.

I shall not bore the committee, in the time the chairman has given me, to go into the details of the need for water research, but I am suggesting we do feel there is a need for bringing together what knowledge we have and what research we have and a need for quality re-

search and management of research if it be the decision of this committee to pass any legislation.

This is essentially my statement.

Mr. ASPINALL. Thank you very much, Dr. Smith, and you can be assured that if continued oversight over this program is not provided in the legislation to date we will see that it is provided.

Any questions?

Thank you very much for your contribution.

The committee has a few insertions to place in the record. It has statements from the following:

Universities Council on Hydrology, Los Angeles.
 Department of Land and Natural Resources, State of Hawaii.
 American Forestry Association, Washington, D.C.
 American Society of Civil Engineers, New York City.
 University of North Carolina, Chapel Hill.
 Conference of State Sanitary Engineers, Resolution No. 11.
 Denver Public Library Foundation.
 American Water Works Association, New York City.
 National Wildlife Federation, Washington, D.C.
 Hon. Spark M. Matsunaga, Member of Congress from Hawaii.
 The National Association of Soil and Water Conservation Districts, Washington, D.C.
 The Izaak Walton League of America, Washington, D.C.
 Rutgers, the State university, College of Agriculture, New Brunswick, N.J.
 Ohio State University, Office of Research, Columbus, Ohio.
 The Chamber of Commerce of the United States, Washington, D.C.
 Manufacturing Chemists' Association, Inc., Washington, D.C.
 Sport Fishing Institute, Washington, D.C.
 Carl E. Kindsvater, Georgia Institute of Technology.
 John E. Kinney, sanitary engineering consultant.

The chairman will state he has looked over those statements and they are either signed or accompanied by a letter to the chairman of the full committee or to the chairman of the subcommittee, and appear to be in order, and unless there is objection the statements will be accepted and placed in the record.

(The statements follow:)

STATEMENT BY THE UNIVERSITIES COUNCIL ON HYDROLOGY

This statement is presented by the Universities Council on Hydrology which was organized in response to a need for expanded education and research programs in hydrology at universities. The council consists of delegates and alternates presently representing 29 leading universities in the United States which are listed at the end of this statement. The council engages in the following functions:

1. To represent the university community in activities aimed at encouraging the growth of education and research in hydrology. It is intended that all academic disciplines within the university which are concerned with hydrology be represented;
2. To provide and disseminate information considered necessary for an adequate representation of the status of hydrologic education and research;
3. To inform its members on matters of importance relating to hydrology;
4. To conduct programs for the purpose of encouraging students to enter the field of hydrology;
5. To serve as a clearinghouse for information on faculty vacancies and available personnel;
6. To coordinate visits of distinguished foreign visitors.

The objectives of the Universities Council on Hydrology are closely related to those of the proposed legislation. The council recognizes the need for expanded education and research in all aspects of the field of water resources. The proposed Water Resources Research Centers would constitute a step in this direction.

The proposed methods of allocating funds appear to be a sound and flexible means of stimulating an expansion of research activity and personnel. Because of the broad scope of water resource problems, the many disciplines that are involved, and the wide variation in local situations, these research centers can be useful and practicable in any State. Most universities have a nucleus of knowledgeable faculty for initial staffing of the centers and the training of additional personnel would be concomitant with the growth of the research programs.

Serious duplication of effort is considered unlikely because of differences in local situations, the abundant communication opportunities afforded by scientific meetings and publications, and the annual inventory required in the act. Moreover, what many sometimes appear to be duplication is in fact desirable if it represents different approaches to the same problem since it brings about a healthy exchange of scientific ideas.

Because of its belief that the proposed legislation will stimulate water resources research and will result in the training of more personnel in this field, at a reasonable cost, the Universities Council on Hydrology strongly endorses this important legislation and recommends its passage.

UNIVERSITIES COUNCIL ON HYDROLOGY—MEMBER UNIVERSITIES

University of Arizona, Tucson, Ariz.	University of Michigan, Ann Arbor, Mich.
University of California, Berkeley, Calif.	Michigan State, University, East Lansing, Mich.
University of California, Davis, Calif.	University of Minnesota, Minneapolis, Minn.
University of California, Los Angeles, Calif.	University of Nevada, Reno, Nev.
California Institute of Technology, Pasadena, Calif.	Purdue University, Lafayette, Ind.
University of Chicago, Chicago, Ill.	Princeton University, Princeton, N.J.
Colorado State University, Fort Collins, Colo.	University of South California, Los Angeles, Calif.
Cornell University, Ithaca, N.Y.	Stanford University, Stanford, Calif.
Georgia Institute of Technology, Atlanta, Ga.	Texas A. & M., College Station, Tex.
University of Idaho, Moscow, Idaho.	University of Texas, Austin, Tex.
University of Illinois, Urbana, Ill.	Utah State University, Logan, Utah.
University of Iowa, Iowa City, Iowa.	Washington State University, Pullman, Wash.
Iowa State University, Ames, Iowa.	University of Washington, Seattle, Wash.
Johns Hopkins University, Baltimore, Md.	University of Wisconsin, Madison, Wis.
Massachusetts Institute of Technology, Cambridge, Mass.	

STATEMENT OF ROBERT T. CHUCK, MANAGER-ENGINEER, DIVISION OF WATER AND LAND DEVELOPMENT, DEPARTMENT OF LAND AND NATURAL RESOURCES, STATE OF HAWAII

I am testifying in support of bill S. 2, the Water Resources Research Act. We in Hawaii have a definite need for the establishment of a water research center in the islands. Our economic growth will be dependent upon solution of water development problems. Heretofore, emphasis has been placed on rapid, effective, development of water, and unfortunately not enough research has been performed on such things as the behavior of basal water bodies on the Ghyben-Herzberg lenses, the effects of pumping on basal water development, and the effects of developing dike-confined water, etc.

We in Hawaii can put a water research program to good use. The University of Hawaii is geared to embark on this project should this bill be passed and funds such as \$75,000 to \$100,000 a year be granted to the University of Hawaii to form a water research center. We are also interested, of course, in other Federal funds that may be made available by this bill to match State money and to expand water research where needed.

At the discretion of your committee, I will be happy to answer any questions with regard to this matter.

STATEMENT OF KENNETH B. POMEROY, CHIEF FORESTER, THE
AMERICAN FORESTRY ASSOCIATION

The American Forestry Association wishes to submit the following statement concerning H.R. 2683 and other bills pertaining to water resources research:

In October 1962 the American Forestry Association called together 40 of the Nation's leading conservationists. These men were assigned the task of drafting a comprehensive program for the intelligent use and management of natural resources on forests and related lands. They represented every major segment of the conservation field. On the subject of water, they recommended:

"1. A continuing and more active program for the development and conservation of water supplies, including structures for the impoundment and transportation of water, and institution of forest and other vegetative management practices, where it has been demonstrated that greater and better timed water yields result and risks from erosion are minimal. To this end, research should be continued and intensified to determine the physical and economic consequences of programs of forest and other vegetative cover management.

"2. Research should be continued and intensified in the fields of weather modification, evaporation suppression, and control of unnecessary losses from unproductive, water wasting vegetation.

"3. Research designed to establish the relationship between land use practices and stream sedimentation should be carried forward to the point that the economic and conservation values of such practices can be appraised with reasonable accuracy.

"4. There should be active programs of physical science and economic research to establish practices and policies which will most effectively provide for pollution control and abatement."

The directors of the American Forestry Association endorsed the above recommendations at their regular board meeting on February 15, 1963. At the same time the directors endorsed the proposals contained in S. 2, the water resource research bill, then before the Senate. Therefore, we wish to extend the same recommendations to the proposals now before your committee.

AMERICAN SOCIETY OF CIVIL ENGINEERS,
New York, N.Y., August 21, 1963.

HON. WAYNE N. ASPINALL,
Chairman, Committee on Interior and Insular Affairs,
House of Representatives, Washington, D.C.

DEAR CONGRESSMAN ASPINALL: Your letter of August 19 is appreciated very much. This announces resumption of hearings by your committee, on S. 2 and related bills in the House.

As communicated to you on previous occasions, this society has continuing interest in all aspects of national water policy. Careful study has been given to provisions of the various bills. Specific position has been adopted by this society, and is transmitted herewith for consideration.

The society is convinced of the need for an increase in research in civil engineering fields related to water resources. This position was reinforced during the 1961 Fort Collins Symposium on Civil Engineering Research and Fields of Water Resources Development, sponsored by ASCE, the Bureau of Reclamation, and Colorado State University. Copies of the report of the symposium have been furnished to your committee.

The report of the Federal Council for Science and Technology has been studied. The development and coordination of a water resources research program, within the established competence of the Federal water resources agencies is desirable. This should be accomplished along the lines recommended by the Federal Council in its February 18 report through the establishment of an Interagency Committee on Water Resources Research, charged with the responsibility for developing and coordinating Federal and federally sponsored university research programs, commensurate with the needs for development of knowledge and techniques necessary for reaching future goals in the field of water resources. The Interagency Committee should be chaired by an individual with great competence and achievements in one or more of the research fields involved, who should be a member of the staff of the Office of Science and Technology. He should be assisted by a small but competent analytical staff, and an advisory committee

of water resources experts, who should be consulted frequently in the formulation of research programs.

This advisory committee should consist of not less than five members, who should be appointed primarily on the basis of ability and experience in the field of water resources development. A majority of the committee should be selected from other than Federal employees. Their terms of office should not be less than 5 years, and should be staggered for continuity. A report of this committee should accompany each project report to Congress, and such review and report should be a prerequisite for authorization or appropriation by Congress.

The studies conducted by the society indicate that most water-related research should occur in centers of higher education, for these places furnish the badly needed increase of research-oriented personnel and trained researchers, as well as push back the frontiers of science. It is recognized that federally sponsored research requires a high degree of research competence on the part of those administering the program. For this reason, a balance is needed in the actual research carried out in Federal organizations, and sponsored research carried out by universities and private research centers.

This commentary is submitted respectfully for the consideration of your committee.

Cordially,

WILLIAM H. WISELY, *Executive Secretary.*

STATEMENT ON ESTABLISHMENT OF WATER RESOURCES RESEARCH CENTERS BY
AMERICAN SOCIETY OF CIVIL ENGINEERS, NEW YORK, N.Y.

A considerable proportion of the more than 50,000 members of the American Society of Civil Engineers are engaged in various phases of water resources research, planning, design, and construction. Indeed, most major water resources undertakings are the responsibility of civil engineers. Usually specialists from various sciences and other disciplines are associated with engineers in such undertakings, particularly in enterprises involving research.

The society's professional concern with sound national water policy is the major responsibility of its Committee on National Water Policy. This committee has carefully considered various bills introduced into both Houses of Congress which would establish water resources research centers at land-grant colleges and State universities, and would stimulate water resources research at other educational and research institutions. Among the bills reviewed have been S. 2, H.R. 2683, H.R. 2689, and H.R. 7234.

In its consideration of these bills and of their impact upon a sound national water policy, the committee interviewed, separately, various Federal agency representatives who are directly concerned with water resources research, and reviewed correspondence from members of the society and others.

The committee notes that section 100(a), lines 12, 13, and 14 of page 3 of the bills, refers to water research projects conducted by the engineering experiment stations. Testimony on S. 2 and reports of various Federal water agencies indicate clearly the large scope of water research projects being carried out by engineering experiment stations. It is believed that the present and potential importance of engineering aspects of water resources research at State institutions should be formally recognized in the bill.

One of the criticisms levied against the bills is concern that the establishment of so many new water research centers will further deplete competent engineering and scientific personnel in Federal and State agencies and in institutions of higher education. Such personnel, expert in water resources research, are already in short supply. The introduction to the bills mentions one objective as being to encourage the training of scientists in fields related to water, but nowhere in the bills is there specific mention of what the committee believes should be a principal objective; namely, to promote the education and training of engineers and scientists competent in water resources fields through support by and participation in research programs. The need for this is emphasized in the report of the Federal Council for Science and Technology mentioned hereafter.

The committee notes that title I of the bills requires annual reports from State agencies which are beneficiaries. It is believed that a similar provision should be introduced into title II relating to grants and contracts.

Society policy has long endorsed efforts to achieve coordination among Federal agencies dealing with water resources. The committee favors strongly the major recommendations looking toward increased interagency coordination in water resources research contained in the report of the Federal Council for Science and Technology dated February 18, 1963, and transmitted to the Senate Committee on Interior and Insular Affairs. The provisions of title III of the bills discussed herein should not conflict with the recommendations of the Federal council.

The provisions of the several bills designed to establish water resources research centers and to stimulate water resources research at educational institutions are not inconsistent with the aims and policies of the American Society of Civil Engineers. The society therefore endorses these bills in principle and suggests the following modifications:

(a) That section 100(a) include reference to water resources research projects in engineering experiment stations.

(b) That section 100(a) contain a specific requirement that "formula" grants be utilized in part to provide for increased opportunities for graduate education and training in water resources research activities undertaken with such grants.

(c) That title II contain similar provisions for annual reports to the Secretary of the Interior as are required in title I.

(d) That the provisions of title III for coordination among Federal agencies engaged in water resources research should not conflict with the proposals contained in the report of the Federal Council for Science and Technology dated February 18, 1963, and transmitted to the Senate Committee on Interior and Insular Affairs.

THE UNIVERSITY OF NORTH CAROLINA.

Chapel Hill, August 7, 1963.

HON. WAYNE N. ASPINALL,
*Chairman, House Committee on Interior and Insular Affairs,
House of Representatives, Washington, D.C.*

DEAR CHAIRMAN ASPINALL: I am writing you concerning S. 2, the water resources research bill, which I understand is now awaiting consideration by your committee.

The University of North Carolina for some years has had a strong interest in water resources research and teaching, at both its Chapel Hill and Raleigh campuses. This interest spans a wide range of aspects of the subject, from hydrology and civil and sanitary engineering to institutional, governmental, and economic arrangements. It extends to a number of university departments, including the department of environmental sciences and engineering, the institute of government, the department of economics, and the department of city and regional planning—all at Chapel Hill—and the department of agricultural economics, the school of engineering and other departments at Raleigh.

I have recently had expressions of interest in S. 2 from both the Raleigh and Chapel Hill campuses. An application has already been received in this office for the establishment of a center for research in water resources under the terms of S. 2. It is apparent, then, that there is a genuine interest at this university in the subject matter of this bill and in its passage.

I believe that the passage of this bill by the Congress would help to forward programs of research which would be of great long-range value to the people of this State as well as the rest of the Nation, and I hope that you will communicate my interest in the bill to the members of your committee.

Cordially,

WILLIAM FRIDAY.

RESOLUTION NO. 11, WATER RESOURCES RESEARCH LEGISLATION OF CONFERENCE OF STATE SANITARY ENGINEERS, 38TH MEETING, WASHINGTON, D.C.

Whereas the conference recognizes the ever-increasing demand for more and cleaner water throughout the Nation; and

Whereas research is urgently needed to determine the most effective and efficient means for protecting, developing, and utilizing our water resources; and

Whereas there is proposed for enactment in the 88th Congress a bill (S. 2) to establish water resource research centers at land-grant colleges and State uni-

versities to promote a more adequate national program of water research: Therefore be it

Resolved, That the conference of State sanitary engineers endorses the principles set forth in S. 2 with the provision that all research activities in water quality be administered by the U.S. Public Health Service.

JUNE 25-28, 1963.

STATEMENT BY JOHN B. TWEEDY, PRESIDENT, DENVER PUBLIC LIBRARY FOUNDATION; ARTHUR H. CARHART, CONSULTANT, CONSERVATION LIBRARY CENTER; JOHN T. EASTLICK, LIBRARIAN, DENVER PUBLIC LIBRARY

Mr. Chairman and members of the committee, the Conservation Library Center, located at the Denver Public Library, Denver, Colo., is directed toward and dedicated to bringing together in a central location the best obtainable collection of reference materials relating to sound management and uses of our natural resources.

This project has received immediate and hearty support by leaders among conservationists and has been officially endorsed by national and international conservation organizations.

Water is a vital, basic resource. It is almost universally involved in every phase of conservation. For this reason, we seek the best possible assembly of materials dealing with sound conservation and uses of water.

So far as we have ascertained, there is no provision for the gathering, into one spot, records of all the proposed studies. To attain the desirable centralization of basic information on water resources, we now would urge and request that your committee include in the water resources research bill a provision that one copy of every report deriving from each study and project resulting from provisions of the act shall be deposited at the Conservation Library Center, Denver, Colo.

For their own value first, for their great value as part of this conservation library center, we would urge such a directive as suggested should be made part of the law.

AMERICAN WATER WORKS ASSOCIATION,
New York, N.Y., September 19, 1963.

HON. WALTER ROGERS,
Committee on Interior and Insular Affairs, Chairman, Subcommittee on Irrigation and Reclamation, House of Representatives, Washington, D.C.

DEAR MR. ROGERS: The Board of Directors of the American Water Works Association, in its meeting in Kansas City, May 24, 1963 voted to oppose Senate bill 2 (H.R. 2683), the bill to establish water resources research institutes at land-grant colleges and State universities. Although all members of the Committee on Interior and Insular Affairs of the House of Representatives have been notified of this action, I am retransmitting it in view of the public hearings on water resources research legislation scheduled for September 30 and October 1.

Attached is a statement on S. 2 prepared by the association's research committee, and accepted by the legislative activities committee and the board of directors.

In view of the action taken by the House of Representatives on House Resolution 504 to create a select committee to investigate expenditures for research programs conducted by or sponsored by the departments and agencies of the Federal Government, we suggest that action on Senate bill 2 and similar legislation be deferred.

The association asks that this letter and its attachment be incorporated in the record of the hearings on Senate bill 2 and related legislation.

Sincerely yours,

RAYMOND J. FAUST,
Executive Secretary.

STATEMENT OF THE AWWA RESEARCH COMMITTEE

The American Water Works Association is pleased to see the interest and desire expressed in Senate bill 2, to provide for the conduct of additional research in the field of water resources and to relate the conduct of this to education and training of scientists at the university level. The recognition of

the need for a variety of talents ranging from the sciences and engineering to the legal and economic disciplines is also noteworthy.

Although recognizing these needs and concurring in the general forward-looking objectives the association cannot recommend approval of Senate bill 2 because it is not realistic in meeting the needs particularly in the area of training, and because there is no provision for interdisciplinary, non-Government consultation and review of the programs and of the proposals for grants, contracts, and other arrangements.

The objectives of this bill can be approached equally well and with a much broader base, through the National Science Foundation; however, it is not inconceivable that the Department of the Interior may also properly stimulate training and research in the area of water resources related to its mission.

The problem is as much to develop talent to conduct research as it is to provide funds for research. Establishing centers where such talent is not present demands removal of talent from institutions currently engaged in training as well as research.

From the narrowest to the broadest definition of scope, water resources is comparable to sanitary engineering. All universities do not have and cannot justify a broad-based teaching and research program in sanitary engineering because there are not enough students nor enough qualified instructors to staff such an effort without weakening the good schools and diluting the overall effort. This would be equally true of any attempt to develop 50 or more water resources research centers. It seems obviously more appropriate to strengthen the few strong centers currently supported by student registration, and to develop and broaden others gradually from the promising smaller training and research cores.

The bill takes no cognizance of the States in which more than one active qualified institution exists, and appropriates an equal sum to such States and to others which have only one or no institution qualified for the purpose. Again, the dilution of effort to meet the objectives is unfortunate.

Therefore an approach to the problem based on institutions in existence rather than on political boundaries would better accomplish the objectives for which the bill is designed.

STATEMENT OF LOUIS S. CLAPPER, CHIEF, DIVISION OF CONSERVATION EDUCATION,
NATIONAL WILDLIFE FEDERATION

Mr. Chairman, the National Wildlife Federation is a private organization which utilizes educational means to attain conservation objectives in the public interest. The 51 independent affiliates of the National Wildlife Federation are conservation organizations located in all States and the District of Columbia. These affiliates and other supporters of the National Wildlife Federation number an estimated 2 million persons.

We appreciate this opportunity of commenting upon S. 2, the proposed Water Resources Research Act.

The National Wildlife Federation was pleased that the Senate Select Committee on National Water Resources, after exhaustive study, saw fit to recommend additional research on water resources. Our organization believes there is a definite need for additional research into a wide variety of water resource problems to which the Federal Government can contribute profitably through grants to appropriate institutions of higher learning. S. 2, as passed by the Senate, would implement this research and we are in accord with its principles.

As we envision it, this should be a counterpart program to that provided by agricultural research stations at land-grant colleges and State universities. Work at these stations has contributed much toward our Nation's world leadership in agricultural production. There is every reason to believe that a program of water research along the same general lines also would pay rich dividends, both in more efficient management of the resource and in the training of persons with professional competence.

It is our belief and hope that research should encompass fish and wildlife and recreation as well as the other beneficial uses of water: domestic supplies, agriculture, industry, power generation, and navigation. In fact, these uses have been mentioned by the Interior Department as areas of study. We are hopeful that the committee may see fit to authorize and direct work in fish and wildlife and recreation which, in most cases, are nonconsumptive and do not damage or impair water for other purposes. Recreation can include boating, swimming,

hunting, fishing, etc. An example might be the large Federal impoundments which could offer many additional public recreational opportunities if the production of game fish was increased. While progress is being made, the simple fact is that much remains to be learned about fish management in large impoundments. If correlated properly with other water resources planning, this would appear to be a proper area of research.

Mr. Chairman, we hope that early favorable consideration may be given to this proposal.

Thank you for the opportunity of making these observations.

STATEMENT OF HON. SPARK M. MATSUNAGA, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF HAWAII

Mr. Chairman and members of the committee, I appreciate the opportunity to be heard and to make this statement in support of the water resources research legislation, a bill which is of extreme importance to the State of Hawaii.

Water is more than an economic resource. It is one natural resource without which there will be no economy. The economic growth of any nation has been linked directly, inseparately, and dramatically with the hydrologic picture—the availability, utilization, conservation, and research development of man's greatest need.

Hawaii's economic growth has been determined to a large extent upon water as the fundamental ingredient. Hawaii is characterized by recent geological topography, relatively low retention of rainfall as surface water, lack of natural damsites, and hydrologic conditions of great extremes, and considerable variability over the eight islands so that the water problem is particularly challenging and vital to the economy of the State of Hawaii. The rainfall of the State of Hawaii is relatively high, averaging better than 70 inches annually. This represents an amount more than double the average of the rest of the States. Water problems in Hawaii are not problems of inadequacy or impending inadequacy but rather problems which require planning, proper management, conservation, and water research for the maximum use and development of our water resources. Governmental agencies and private organizations have pressed for water research to cope with our unique water needs and problems. It is not the lack of interest or the lack of problems that hampers the research but rather a limitation of funds.

The University of Hawaii has a committee on water resources research, consisting of members both from the campus and off the campus, including individuals who represent the different facets in water development and management efforts. This committee recently summarized Hawaii's water resource research efforts over the past 5 to 6 years, confirming my opinion that far too little research efforts have been expended in comparison to the size of the problem. The committee unanimously recommended additional resources including funding be developed and a permanent research center in this area be established at the University of Hawaii.

I urge a favorable report on the water resources research legislation for it opens intensified research into man's greatest need, water.

STATEMENT BY J. W. CORNWALL, FAIRFIELD, WASH., CHAIRMAN, RESEARCH COMMITTEE, NATIONAL ASSOCIATION OF SOIL AND WATER CONSERVATION DISTRICTS

There is virtually unanimous agreement by all the responsible agencies and authorities in the field of water that the water supply needs of the United States are going to increase sharply and continuously in the years ahead. Conservation and wise management of the available supplies are imperative if we are to have enough water for our essential uses during the remainder of this century and in the period thereafter. Potential additions to the available supply need to be developed, waste must be materially reduced, and capabilities for reuse substantially increased.

The attainment of these vital objectives will require improved knowledge in many fields—economic as well as physical, social as well as political. The need for research of all of these fields bearing on the water problem has been amply justified by extended analysis and hearings by competent authorities. The in-

vestigations of the Nation's water problems have also made clear the oncoming need for a larger body of well-qualified personnel in the various key areas of water resources conservation, development, and use.

The enactment of S. 2 would contribute in an important way to the accomplishment of these necessary water knowledge, research, and personnel objectives.

The National Association of Soil and Water Conservation Districts (NACD) is vitally concerned with the conservation, development, and use of water supplies—and with those disciplines which can contribute to the quality, quantity, and availability of supplies. This association, jointly with the National Reclamation Association, sponsored a national water research symposium in Washington, D.C., March 28–30, 1961, for the specific purpose of acquainting the general public with the seriousness of the problem and to help focus attention upon the need for a more adequate research program.

At that time we pointed out that "research is the key to the solution of the water problem, but it is generally agreed that our present water research program is entirely inadequate to meet the many and diverse water situations which are developing so rapidly."

The symposium, participated in by many of the Nation's most distinguished water authorities, underscored again the increasing dimensions of the total water problem, and the critical need for moving ahead with an enlarged and comprehensive program of water research.

The last annual convention of the National Association of Soil and Water Conservation Districts in Denver, February 3–7, 1963, endorsed in total the five basic recommendations of the Senate Select Committee on National Water Resources. This, of course, included the third recommendation, which is most pertinent to S. 2:

"Third, a greatly expanded and comprehensive Federal program of scientific research on water, probing ways both to increase our supplies and to increase the efficiency of our use of available supplies."

The 2,930 soil and water conservation districts of the country—in all 50 States, Puerto Rico, and the Virgin Islands—represent the first custodians of the Nation's annual replenishment of water. These districts with their cooperators—now numbering in excess of 1,800,000 farmers, ranchers, and other landowners and operators—are in a position to make a major contribution to the conservation, development, and improved management of water supplies. Indeed, they are now doing so. In the years ahead they will do even more, for water is a critical element in their operations. All of them are water users. At one time or another each year, most districts face too much or too little water. They engage in drainage, irrigation, water storage, flood prevention, and other forms of water management and control.

Across the landscape of America, districts are uniting in common cause the largest body of conservation-minded citizens owning and operating land—the first catchment for most of the annual replenishment of our water supply.

We in the NACD are impressed by the merits of S. 2. It constitutes an important improvement, in its language and provisions, over S. 3579 (of the 87th Cong.), which was widely circulated for the purpose of review and comment.

It is plain in S. 2, for example, that the work to be undertaken would be a part of a comprehensive, expanded program of water research. It is intended to supplement existing and future water research efforts—including those by appropriate Federal agencies and private institutions—and is not intended to serve as a complete program.

The dimensions of water research needs in the United States are so large and diverse, it would have been a serious mistake to centralize administration, or to limit the opportunities for Federal participation in water research, through narrowly drafted or interpreted legislative provisions.

We believe S. 2 has beneficially clarified questions raised last year about the relationships of the various Federal agencies and programs involved in water research. Nothing could be plainer than section 301, which declared that "nothing in the foregoing section nor in this act is intended nor shall be construed as giving its Secretary or the Department of the Interior any authority or surveillance over water resources research conducted by any other agency of the Federal Government, nor shall it be construed as repealing, superseding, or

diminishing existing authorities or responsibilities of any agency of the Federal Government to plan and conduct, contract for, or assist in research in its areas of responsibility and concern with water resources."

We are pleased to note the provisions in S. 2 which call for an annual review of the various water resource research and investigations projects underway—and the protections against low priority or duplicating research.

One might readily argue for the authorization of larger or smaller sums of money in support of the research work contemplated by this bill. Our position, however, is that the initiation of the cooperative research program—with the presently indicated breadth of institutions, foundations, firms, and individuals—is much more important than the precise number of dollars allocated for the work.

Further, a program of this character and size cannot be launched immediately. After the authorization, there must be appropriations. Even after these steps time must elapse before the intent can be translated into the fact of research underway.

We could comment on many other provisions of S. 2. Our purpose is probably best served in this instance, however, by observing that the soil and water conservation districts of America need and will be able to do a better job in connection with the water supplies coming under their management if they have the benefit of the added research. As district supervisors, as district cooperators, and as citizens, we in the NACD believe the prospective water requirements of the United States demand the kind of water research efforts proposed in S. 2—in addition to existing and other efforts which may also be undertaken in this field.

The danger in the water resources situation is not that we will do too much, but that our attention to it will be too small and come too late.

THE IZAAK WALTON LEAGUE OF AMERICA, INC.,
Washington, D.C., September 27, 1963.

HON. WAYNE N. ASPINALL,
Chairman, Committee on Interior and Insular Affairs,
House of Representatives, Washington, D.C.

DEAR MR. CHAIRMAN: The Izaak Walton League of America would like to go on record with your committee in support of S. 2. Since its establishment, the league has had a profound concern for proper management and utilization of water—not only because water is so important to fish, wildlife, and outdoor enjoyment, but primarily because water in ample supply and usable quality is vital to man's existence.

The basic purpose of S. 2, as we see it, is to assure the abundance of water in both quantity and quality necessary to meet our increasing requirements. To accomplish this purpose, the bill would stimulate, sponsor, and provide for research, investigation, and experiment in the fields of water and related resources as they affect water. It would thereby supplement present programs, and encourage the training of scientists by assisting colleges and universities in their development of water resources research programs. The Izaak Walton League strongly endorses this approach.

Mr. Chairman, we claim no special competence in determining the ways and means by which Federal research dollars should be distributed to achieve maximum results. Nonetheless, the proposal to encourage the land-grant colleges, or other universities as specified by the States, to establish water resources research programs on permanent bases appears an essential first step. This method will assure most effective handling of water problems peculiar to individual States, while at the same time building the nationwide store of knowledge necessary to broad public understanding of water resource issues.

The league takes special note of the bill's important provision that these water resource research programs be universitywide, that they cut across all disciplines to include the social sciences as well as the physical. Water engineers can no doubt continue to develop more efficient ways of managing water, but, without consideration of social needs, such purely scientific advances might well contribute nothing meaningful to man's total environment—indeed could easily detract from it.

In conclusion, Mr. Chairman, we emphasize a point made by Senator Anderson when introducing S. 2 last January. He noted that, as a result of a University

of New Mexico water economics study, "traditional social and economic concepts about water have been shaken not only in New Mexico, but in all water-short areas * * *." We are sure that we shall be shaken still further, as research brings us a whole body of new facts about water, its use, and actions necessary to meet our future needs.

We do need more facts about water—and the Federal-State approach, with universities the core of the effort, makes the best kind of sense.

Respectfully,

ROBERT T. DENNIS,
Assistant Conservation Director, IWLA.

RUTGERS—THE STATE UNIVERSITY,
COLLEGE OF AGRICULTURE,
New Brunswick, N.J., September 26, 1963.

HON. WAYNE N. ASPINALL,
*Chairman, Interior and Insular Affairs Committee,
House of Representatives, Washington, D.C.*

DEAR CONGRESSMAN ASPINALL: I am writing to express to you our sincere interest in the passage of H.R. 2689 or similar legislation to establish water resource work in the land-grant or other universities. The progression of discovery—placing the facts before the public—public action is a heritage of the land-grant system. In addition to this progression, men and women are trained in formal educational programs who can serve the public as technicians.

The developments in agriculture resulting from work in the land-grant colleges show parallel opportunities in the environmental sciences, including water as a resource.

For over 50 years the New Jersey Agricultural Experiment Station has been working in water management for mosquito control. For over 40 years we have worked on water quality as a public health matter.

This work has been the basis for solid fact-based legislation and social action. Benefits to the people by support of the university's effort in this field through progressive legislation will be assured on the basis of this past experience.

Sincerely yours,

LELAND G. MERRILL, Jr.,
Dean of Agriculture.

THE OHIO STATE UNIVERSITY,
OFFICE OF RESEARCH,
Columbus, Ohio, September 27, 1963.

HON. WAYNE N. ASPINALL,
*Chairman, Interior and Insular Affairs Committee,
House of Representatives, Washington, D.C.*

DEAR SIR: The following statement portrays the attitude of the Office of Research of the Ohio State University toward the Anderson bill, S. 2, now before your Subcommittee on Irrigation and Reclamation for consideration.

This office endorses the precepts of the Anderson bill, S. 2, for appropriation of funds to establish water resources research and training programs in the land-grant colleges.

I am certain that this university endorses those provisions of the bill which provide for a broad interdisciplinary approach to the problems of water supply and wishes to call the attention of the committee to the many disciplines in the land-grant colleges which are prepared to make contributions to the solutions of water supply problems. Furthermore, these institutions have well-established working relations with Federal, State, and local agencies in the water resource field. Through these working relationships a means exists for (1) identification of water resource problems requiring research; (2) dissemination of the results of such research; and (3) avoiding duplications of effort. The Ohio State University as one of the land-grant institutions is especially well equipped to handle this type of program through its organizational structure and its numerous facilities and experienced staff associated with water resource problems, and is, therefore, vitally interested in the furtherance of this proposed legislation.

Cordially yours,

ALFRED B. GARRETT,
Vice President for Research.

CHAMBER OF COMMERCE OF THE UNITED STATES,
Washington, D.C., October 1, 1963.

Hon. WALTER ROGERS,
*Chairman, Irrigation and Reclamation Subcommittee,
Interior and Insular Affairs Committee,
House of Representatives, Washington, D.C.*

DEAR MR. ROGERS: The Chamber of Commerce of the United States supports S. 2 and similar bills (H.R. 2683, H.R. 2689, and H.R. 4048) subject to the amendments suggested hereafter.

Additional research, investigations, and experiments in the field of water and related resources are needed to help meet the water demands of future generations. The training of additional scientists to conduct such activity is vital.

The stimulation of more effective research effort at industrial, State, and local levels, and the training of additional scientists by the States and other agencies are the most satisfactory methods of achieving greater knowledge about water because they would minimize unwarranted Federal research activity, providing a preferable alternative to the expansion and duplication of federally conducted research effort. To promote this objective we recommend amendments as follows:

The purpose of this legislation as stated in the preamble of S. 2 should be amended to make it clear that one of the objectives of this act is to minimize the need for expansion of Federal water research agencies and activities.

The language of section 100(a) of title I of S. 2 relating to " * * avoidance of any undue displacement of scientists and engineers elsewhere engaged in water resources research * * *," while recognizing a potentially serious problem, fails to provide sufficient guidelines to prevent undue displacement.

We suggest that this particular deficiency be corrected by requiring that no Federal funds, under the terms of this legislation, may be granted for the establishment of a new water research agency or center in any State until optimum utilization has been made of existing water research facilities located in the individual or several States. This can be implemented by the advisory board recommended below.

Moreover, we urge that the automatic formula for grants to States in section 100(a) of S. 2 be deleted and that such grants be made subject to allocation and review by the advisory board which we recommend below as an amendment of section 300 of title III. This would be more likely to assure optimum water research.

This legislation should also provide a definite termination date for the program of annual grants of funds to the States under subsections (a) and (b) of section 100 of S. 2. Lacking this, programs of intense research activity could be initiated without any requirement for future congressional review of either the continuing need for, or the desirability of, the proposed grant-in-aid programs. The inclusion of this provision is essential in order to prevent development of these programs into perpetual and unwarranted Federal activities.

Title II of S. 2 should also be amended to apply to all water problems of all Federal agencies having a research mission. The title should also provide a terminal date for the authorization of appropriations in order to assure full and positive congressional review of any continuing need for the proposed programs.

We support the intent of section 300 of title III of S. 2, but it should be strengthened, requiring the formation of a qualified, top-level scientific advisory group composed of persons other than Federal employees and charged with advising the Secretary of the Interior whether certain water research efforts will contribute to a comprehensive, nationwide program of water and related resources research.

We oppose the establishment of a Water Resources Service as outlined by sections 302 and 303 of H.R. 2683, H.R. 2689, and H.R. 4048. Existing bureaus or services within the Department of the Interior, already engaged in water research, should be assigned responsibility for administering programs authorized by this legislation, thus avoiding unnecessary expansion of the Federal payroll.

We recommend, therefore, that provisions establishing a Water Resources Service not be included in the legislation and that the provision of section 302 of the House bills, stating that no more than 4 percent of any funds appropriated pursuant to the provisions of this bill may be used for the purpose of administration, be incorporated in section 304.

It is further recommended that language such as that contained in section 304 of S. 2 not be included in legislation on water research. If legislative provisions

regarding disposition of inventions is deemed necessary, the objective of section 304 can best be accomplished by adoption of language identical to that provided in section 12(a) of the National Science Foundation Act of 1950, as amended. Section 12(a) of the act provides that—

“Each contract or other arrangement executed pursuant to this Act which relates to scientific research shall contain provisions governing the disposition of inventions produced thereunder in a manner calculated to protect the public interest and the equities of the individual or organization with which the contract or other arrangement is executed.”

This language will protect the public interest in patents resulting from research financed under this program and protect the contractors right to background information, processes and similar data obtained by expenditures of the contractor's own funds.

Ownership of inventions derived from federally sponsored research and development is highly technical and has been the subject of numerous hearings in both the House and Senate. At the present time, several bills have been introduced with varying provisions for the establishment of a Government-wide policy. The national chamber suggests that the matter of patents and proprietary rights be the subject of separate hearings before appropriate congressional committees, at which time the pros and cons of this technical and controversial subject may be fully examined.

We believe that the provisions of S. 2 and similar bills with the amendments and deletions we have recommended constitute the maximum authority and arrangements needed to stimulate water research activity.

We request that this letter be made a part of the record of the hearings on this legislation.

Sincerely,

Theron J. Rice.

MANUFACTURING CHEMISTS' ASSOCIATION, INC.,
Washington, D.C., September 30, 1963.

HON. WALTER ROGERS,
Chairman, Subcommittee on Irrigation and Reclamation, Committee on Interior and Insular Affairs, House of Representatives, Washington, D.C.

DEAR MR. CHAIRMAN: I am pleased to write to you on behalf of the Manufacturing Chemists' Association, Inc., in regard to several bills on water resources research now pending before your subcommittee, including H.R. 2683, H.R. 2689, H.R. 4048, H.R. 7234, H.R. 7239, H.R. 7258, and S. 2. In the comments to follow, reference will be made only to S. 2 for the sake of brevity.

The Manufacturing Chemists' Association, Inc., is a nonprofit trade association of 198 companies both large and small representing more than 90 percent of the productive capacity of the chemical industry in the United States. Adequate supplies of water are vital to chemical manufacturing, hence this industry has an abiding interest in water resources research.

Our association feels that the Federal Government can and should play a major role in furthering such research. For this reason we supported the creation of seven regional laboratories by the 1961 amendment to the Federal Water Pollution Control Act, and we agree with the grants and contracts provided for in title II of the proposed Water Resources Research Act (S. 2).

The establishment of State water resources research institutes as contemplated by title I also offers attractive possibilities of drawing participants from related disciplines into active attention to water problems. We feel strongly, however, that the establishment of 50 or more such centers would result in duplication and confusion, and would spread even thinner the meager supply of competent personnel in the field. A grouping of States with common problems, perhaps on a river basin basis, would reduce the number of locations, and in our opinion, increase the effectiveness of the program.

We express no opinion on the assignment of these responsibilities among the executive departments, a matter which we prefer to leave to the judgment of the Congress.

Section 304 of S. 2 would require that all patents and technical information developed in this program be made freely available to the general public. The subject of a uniform policy with respect to rights in patents growing out of Government-sponsored research or activity is under active review at present by committees of Congress having general cognizance in patent matters. Basic

questions of patent policy are involved which require the careful balancing of the equities between the inventor, his employer, and the Government. Aside from the balancing of these equities, consideration needs be given to the overriding interest of the public in establishment of a policy whereby maximum exploitation of such patents for the general benefit will be assured. For these reasons, we strongly recommend that section 304 be eliminated from the bill under consideration.

We would appreciate your incorporating this letter in the hearings on this legislation, to record both our support and our suggestions for change.

Sincerely,

G. H. DECKER.

SPORT FISHING INSTITUTE,
Washington, D.C., October 1, 1963.

Re S. 2 and H.R. 2683.

Hon. WAYNE ASPINALL,

Chairman, Committee on Interior and Insular Affairs, House Office Building, Washington, D.C.

DEAR CONGRESSMAN ASPINALL: The Sport Fishing Institute favors the legislation proposed and embodied in Senate bill 2 and House bill 2683, introduced by Senator Clinton P. Anderson and Congressman Thomas G. Morris, respectively, to promote a more adequate national program of water resources research. Because we have a primary interest in fish conservation we are naturally vitally concerned with the status of the main medium in which the fishery resources live. For some time now, the Sport Fishing Institute has urged the Congress to increase the program of the Division of Water Supply and Pollution Control (U.S. Public Health Service) in order to place more emphasis on high standards of water quality as well as improved water quantity. A set of living standards to provide the optimum ecological situation for the fishery resource can only be obtained when we know what we are shooting for. This, in essence, requires considerable long-term basic research.

We feel that S. 2 and H.R. 2683 will go far toward reaching desirable goals in these areas of need. A water resources research program, such as is proposed in these bills, through the national land-grant colleges, universities, and State-specified institutions of higher learning similar to that which was authorized for agriculture by the Hatch Act of 1887, would go far toward the encouragement and training of scientists at the ground level. In 1960, the President's Science Advisory Committee transmitted to the President the findings and recommendations of its Panel on Basic Research and Graduate Education, chaired by the eminent Dr. Glenn T. Seaborg, then chancellor of the University of California, Berkeley, and also chairman of the Atomic Energy Commission. That report reached several important conclusions, among them this one: " * * * American science in the next generation must, quite thoroughly, double and redouble in size and strength. This means more scientists, better trained with finer facilities * * *. Our population is rapidly increasing, so that there must be more and more young people to be taught, and we have nothing like the number of qualified teachers that we need even now."

I would like to point out that sport fisherman were found to number 47 million in 1960 (perhaps increased to 50 million in 1963). The business activities generated by their fishing now approaches the \$3 billion mark. The outlook for the future: "Sport Fishing—Today and Tomorrow" (prepared by the Outdoor Recreation Resources Review Commission) predicts that numbers of anglers will increase 50 percent in the next 15 years, and 150 percent by the year 2000. This only serves to illustrate the tremendous impact of the outdoor recreationist upon the recreational water facilities that seem to be decreasing day by day, due to many causes. This carries significance, with respect to the proposition under discussion (S. 2), in view of this conclusion in Dr. Seaborg's panel report: "Simply in the terms of economic self-interest our proper course is to increase our investment in science just as far as we can, to a limit not yet in sight."

Obviously, Mr. Chairman, there is a tremendous task ahead and it has broad implications. The proposals embodied in S. 2 and H.R. 2683 to encourage water resources research programs on permanent bases is one of the A B C's. As Senator Anderson once said, there is a definite need for centers throughout the country where State officials concerned with State, regional, and local water problems; local officials involved in municipal water supply, and waste disposal

from industries; farmers who are dependent upon water to produce their crops; recreation planners; administrators; soil conservationists and the many others who are especially concerned with water can turn both for research assistance and information. A system of communication to water users must be developed through which new information and the results of research can be disseminated.

Water is all-important to this Nation's great fish and wildlife resources. Many water laws that are now antiquated need to be modernized. The method of evaluating the economic benefits derived from water must be refined and updated. We need many new facts. This action program as proposed in S. 2 and H.R. 2683 appears to be the best answer thus far proposed to getting this knowledge which has been so long delayed from lack of coordination.

Our agricultural research establishments show the results of a highly successful national research system boasting some 76 years of experience and demonstrated worth. If the water resources research program can attain equal status we may be justifiably proud. My closing observation is that water research legislation is 76 years behind that for agriculture.

Mr. Chairman, Sport Fishing Institute earnestly commend S. 2 and H. R. 2683 to your committee and urges their prompt approval. Without such legislation enacted by Congress in the very near future, we will be living in the "dark ages" of our own muddled water resources.

I respectfully request that this letter be included in the record of hearings on S. 2 and H.R. 2683.

Sincerely,

PHILIP A. DOUGLAS, *Executive Secretary.*

OCTOBER 2, 1963.

HON. WAYNE N. ASPINALL,
Chairman, Committee on Interior and Insular Affairs,
House of Representatives, Washington, D.C.

DEAR MR. ASPINALL: "Is there any good reason why the program called for in this bill (S. 2) cannot be conducted by the National Science Foundation?"

This question was asked a number of times at the hearing on subject bill September 30 and October 1, 1963.

The panel of witnesses representing the Association of State Universities and Land-Grant Colleges had already concluded their testimony when this question came up, and I as chairman of the association's panel did not feel it appropriate in view of the late hour to ask for an opportunity to comment on the question, hence this letter.

There is a reason why the results envisioned for this bill would not be accomplished if the National Science Foundation type program were used to employ title I funds. The reason for this categorical assertion is rooted in sound educational philosophy; it has been demonstrated in practical application by experience under the Hatch Act. Let me explain.

Of the total sum authorized by the bill when fully implemented, funding under section 100(a) would comprise one-fourth (\$5 million) in allocations made to the States at a rate of \$100,000 each for support of a water research center oriented to a university program. The funding would be assured to the center on a sustained basis. This feature of a guaranteed minimum level of additional support to a university program that is already set up and operating is the explanation of its success.

Why? Because research personnel are the kind of people that they are. One would think that the characteristics of an inquiring mind and restless curiosity—the hallmarks of a research professor—would be associated with a carefree attitude toward continuity of the job. This isn't the case. In fact, the good research scientist's greatest concern is the fear of having his project interrupted or thrown off schedule or terminated by the mysterious happenings that occur "in the front office where someone monkeys with the budget." Above all else they want assurance that no man-made development will destroy the experiment which becomes more valuable each day it runs. The saying that "hell knows no fury to match that of a geneticist who has lost his genes" is no joke, and the research administrator's job is to see that the geneticist in the laboratory doesn't lose his genes for lack of money to keep the research project going. Thus section 100(a) funds will enable the scientist and the research administrator to plan a program to be carried out over the period of time that may be required for the inquiry at hand—2 years, 6 years, 10 years, or, as often is the case, an unknown period of time—to dig out the answers that they seek, all this without

worry or concern over termination of the project, or of employment, in the middle of the exercise. Can you imagine trying to recruit a qualified professional for a job that may fold in a year or two?

Contrast this with the typical NSF grant. It is made on a project basis for a stated period of time. It assumes that the applicant is employed in a university which has an on-going program—a standby ability to serve—which can assimilate the NSF grant into its program much the same as a person digests an occasional additional meal and then resumes his regular schedule.

The important point to note here is that the section 100(a) allocation would add to the basic ability of the university to provide this standby ability to serve, that is, to broaden its scientific capability and maintain it on a stable and sustained basis. Section 100(b) matching grants would have somewhat the same effect (as has been demonstrated also in the parallel case of Hatch Act funding).

Title II funds, however, clearly have the character of limited-term grants, such as those made by the NSF for a specific project of predetermined duration after which the organization is obliged to reshuffle its personnel and workload to adjust to the new situation. Incidentally, this "bellows action" in campus research administration is one of the reasons why payment of overhead is justified for universities undertaking the so-called chore research on a limited-term basis.

Thus the answer given to the question posed at the beginning of this letter is that the research potentialities of this bill could not possibly be achieved if the funding is based entirely upon limited term grants. It would be as sensible to expect the flow from one's home water tap to continue without change even though the intake at the waterplant were subject to intermittent interruption. The only place to store a supply of creative talent is in a human mind, and humans can't be put in the idle stockpile as one would put a machine tool in mothballs.

At the risk of discussing a seemingly extraneous point, I would like to identify what I consider to be a point of fundamental difference between a professor's attitude toward his employment and the attitude of one who lays his job on the line at the ballot box every 2 years or so. A Congressman, for example, is accustomed psychologically to toil in expectation that the job may blow up in his face every other year. The typical professor, on the other hand, is terrified at the prospect of intermittent employment, and he looks with considerable awe upon one who takes this sort of thing in stride. He has genuine (though sometimes grudging) respect for one who is willing to live under the threat of such risky employment, but he recoils from the idea of doing it himself. Nonetheless, there is a place for professors and a need on the part of society for their work. Thus if society expects to have them, it must take them as they are, not as society might like them to be. To put this in different words, we have here another explanation for the widely established system of academic tenure and campus job security, including the practical necessity for sustained funding of a research program, which is the point at issue here.

In conclusion, I would hope there might be an opportunity to discuss this particular aspect with you further if there is any likelihood that the potentialities we see in S. 2 will be watered down by alteration of the basic principle contemplated in title I funding.

Respectfully,

W. E. MORGAN,

*Chairman, Water Resources Committee, Association of State Universities
and Land-Grant Colleges.*

STATEMENT OF CARL E. KINDSVATER, DIRECTOR OF THE WATER RESOURCES CENTER,
GEORGIA INSTITUTE OF TECHNOLOGY

I am Prof. Carl E. Kindsvater, director of the water resources center at the Georgia Institute of Technology. It is a pleasure to present my views on the companion bills, H.R. 2683, H.R. 2689, and S. 2, which deal with the establishment of water resources research centers and the support of water resources research in colleges and universities. It was my privilege to be in contact with Senator Anderson and his staff during the period of research and analysis which led to the formulation of S. 3579 (87th Cong., 2d sess.). In subsequent exchanges of correspondence with its authors, and as a result of careful studies of the successor bills, including H.R. 2683 and the amended S. 2, I am convinced

that the passage and implementation of this legislation, in essentially the form approved by the Senate on April 23, 1963, is imperative.

Hundreds of pages of previous testimony by Government officials, educators, practicing engineers and scientists, and representatives of a variety of group interests have established the fact that this Nation has serious problems related to the conservation, utilization, and control of its water resources. It has been established, too, that there are great deficiencies of basic data and basic knowledge, and that there are misunderstandings and differences of opinion regarding the manner and means of managing this vital resource. Fortunately, many of the misunderstandings and differences of opinion have been resolved, and from the composite record of the hearings to date, I believe a consensus on most issues supports my conclusion that the proposed legislation provides both a practical and an effective means of accomplishing its basic objectives, about which there appears to be very little disagreement.

I am cognizant of several features of the bill which have caused Federal agencies, and others, to express reservations regarding duplication of effort, shortages of qualified research manpower, and inefficiency in the expenditure of Federal research funds. I shall comment on each of these points.

Persons who predict duplication in research include some persons whose conclusions are based on inadequate information. The fact that the Federal Government is already supporting 20 or 40 or 100 research projects on, say, groundwater does not, by itself, indicate duplication. The difficulty here is that their source of information may not have specified which of the innumerable facets of groundwater was being researched in each instance. Other persons who deplore duplication in research reveal by their argument that they are in fact concerned with routine data collection or routine testing—not with research. I am sure that I am not alone among witnesses who have testified that duplication, when it relates to goals, rather than to methodology, is an important prerequisite of a proper research environment. Paradoxically, this is true because research goals inherently are poorly defined, and research methodology is seldom, if ever, routine. In short, the benefits of a reasonable amount of the right kind of duplication include the development of new research techniques and equipment; the revelation of other, equally important research areas; and even the attainment of unanticipated goals, which may be more important than that which was originally sought.

The wrong kind of duplication occurs when identical, usually routine or standard procedures are used to obtain predictably identical results. The obvious remedy for that kind of duplication is improved communications, a subject which is dealt with effectively in the provisions of the proposed act. This solution is not sufficient, of course, when the duplication is intentional. The problem then becomes one of administration, and I believe that adequate administrative safeguards are contained in the proposed legislation to prevent unnecessary or undesirable duplication.

There is also the claim that the number of "hydroscientists" (a relatively new term whose definition, unfortunately, depends on the vocational bias of its user) is insufficient to staff a water resources research center in every State. The greater number of persons who voice this criticism are those who quote questionable statistics regarding one professional group, namely, hydrologists. In this connection, I can say without fear of contradiction that there is considerable disagreement among hydrologists as to just what their field encompasses. Moreover, the Universities Council on Hydrology (UCOH) has only recently initiated the first known comprehensive survey of education and employment of hydrologists in the United States.

More importantly, however, the wording of the proposed legislation is quite clear in that it places no restriction on the kind of water-related research which may be undertaken in the research centers. The wisdom of this feature of the legislation is dramatically illustrated by the following quotation from the report of the Federal Council for Science and Technology ("Federal Water Resources Research Activities," 1963; ch. 6, "Nature of the Problem") :

"That water resources research is much broader than hydrologic research is shown by the following list of the principal specialists needed: mathematicians and statisticians; physicists, and solid-state geophysicists, biophysicists, electronic physicists, and solid-state physicists; chemists including physical, isotope, organic, analytical, and colloid chemists, geochemists, and biochemists; geologists including physical and structural geologists, stratigraphers, geomorphologists, paleontologists, geognostic geologists, sedimentologists, soil scientists, and

ground-water geologists (hydrogeologists); biologists including botanists, physiologists, ecologists, foresters, zoologists, entomologists, ichthyologists, microbiologists, bacteriologists, and toxicologists; meteorologists and climatologists; hydrologists including limnologists, glaciologists, hydraulic engineers, geohydrologists, hydrochemists, and hydrographers; engineers including civil, mining, structural, chemical, sanitary, coastal, and agricultural engineers; economists including resource economists and systems analysts; political and social scientists; and lawyers."

It follows, as is demonstrated by university programs already in existence, that good research programs can evolve from a nucleus of competent persons professionally identified with any one of the fields listed above. Let it suffice to say, therefore, that the science and technology of water management, in the broadest sense, is so complex, and it involves so many facets of nature, of man, and of man's institutions that it is necessarily multidisciplinary. Consequently, the trend in virtually all American universities today is to move toward an interdisciplinary approach to water resources education and research. The authors of the proposed legislation have made it quite clear that they envision no standard pattern, as regards either organization or research emphasis, in the projected research centers.

A temporary shortage of qualified manpower in some fields also has led to expressions of fear that universities embarking on new or expanded programs of water-related research will acquire the necessary additional personnel by luring them away from key positions in existing research organizations. The implication is that universities will suddenly acquire the financial means of competing unfairly in the personnel market. I say that the principal enticements which a university can offer (and certainly not all persons find them irresistible) are such intangibles as a more favorable research environment and the opportunity to educate young people. In particular, as regards water research, I would emphasize that the university environment provides opportunities for collaboration in interdisciplinary research which are often impossible under other circumstances.

I believe that the surest and fastest way to relieve any really serious shortages is to increase the output of our universities by increasing the competence as well as the numbers in our university teaching and research staffs. If this were immediately accomplished in certain fields, there might result a temporary aggravation of the manpower shortage in some nonuniversity organizations. But, to restrain or limit, by any means, an individual's freedom to choose the employment which is best adapted to his capabilities and his desires is not only unethical, but also detrimental to the overall national effort in the field of water resources research.

A less frequently expressed reservation regarding the proposed legislation is related to "efficiency" and "standards of performance" as measures of the effectiveness of Federal research programs. Literally interpreted, these terms can be applied with some success to the construction of a dam, but they are quite inappropriate as regards research. The very nature of research (which we might define as explorations in areas of ignorance) is such as to make simple scales of progress and accomplishment impossible of formulation. Consequently, progress can be measured only in terms of knowledge gained, and the terminal accomplishment is very often the realization that the original goal, conceived in ignorance, is impossible of attainment. Thus, progress and accomplishment can be gaged only by administrators who are themselves technically competent in the field of the researcher. Adequate administration is believed to be possible under provisions of the proposed legislation.

In conclusion, I believe that increased university participation in both basic and applied water resources research should be encouraged, and I believe that the proposed legislation is an effective means of providing the necessary stimulus.

STATEMENT OF JOHN E. KINNEY, SANITARY ENGINEERING CONSULTANT,
ANN ARBOR, MICH.

Education: BCE (1941), MCE (1942) with major in each in sanitary engineering.

Experience: Prior to World War II with State of New York Health Department; during the war on water supply with U.S. Navy; since the war, 3 years with consulting engineering firm, 5 years on the Ohio River Valley Water Sanitation Commission staff and 9 years as a consultant, principally concerned with industrial waste control and river surveys.

Clients include steel, chemical oil refining and metal finishing industries and State and municipal agencies.

Associations: American Society of Testing Materials Committee D-19 on Water; ASTM representative on the Engineering Joint Council National Water Policy Panel; ASTM representative on the Joint Committee on Uniformity of Methods of Water Examination; member, American Society of Civil Engineers; American Water Works Association; Water Pollution Control Association.

Mr. Chairman and members of the committee, research offers the hope for solution of many problems. In similar manner, it can be the tool for delaying progress in solving problems because it offers an excuse for confusion.

Congressman Kirwan has rightly noted that the magic word introduced into budget requests is "research"; nonexistent in the "good old days when we had balanced budgets" but now the "main topic in any room where hearings are being held." His comment, made during the hearings of the Appropriations Subcommittee on Interior appropriations for 1964 (p. 484), was excited by a recognition of the duplication of effort among the Federal agencies on water research.

That there is duplication of effort is eminently clear from a review of the 1963 Report of the Federal Council for Science and Technology on Water-Resources Research. The same report also made it clear there is no Federal policy for evaluating or comparing research proposals in different fields—"we must depend on the judgment of the agencies that undertake the programs."

The report deplored the overlapping responsibilities and missions of the some three dozen bureaus or equivalent units in seven major departments and independent agencies engaged in water resources research but then proposed that the tempo of competition be increased. It recommended a coordinating effort through its own office, but, and obviously to satisfy the several bureaus which have staked out claims, recommended there be no interference with authorities presently vested in any agency.

The Council report was written with the tone of urgency for increasing appropriations for research. It provides the feeling that only research can save our water resources. The testimony of many before the recent hearings by the Natural Resources and Power Subcommittee of the House Committee on Government Operations offered the same thesis. Their testimony asked increased Federal funds for research in the same vein as it called for clean water. The generalizations were directed toward nebulous objectives without details which would determine whether the objective has been or could be accomplished.

Three areas would seem to deserve attention before there is a determination whether S. 2 should become law, with or without modification. These are policy, existing problems in federally sponsored research and needs for research and training.

Policy

When Dr. Weisner appeared before the House Government Operations Subcommittee there was discussion on the lack of a national Federal water policy. If my interpretation of Dr. Weisner's comments was correct, he argued that the primary attention should be given to expanded research and then the results of this research should determine our national water policy. He did not seem to feel that the Congress should establish a policy of defining what the roles of the agencies should be, and that in turn influence the research reach would do.

This is not inconsistent with the Council report. Our national water policy is the sum of the desires of the three dozen agencies. Each has recognized the role of water in our economic and social development as the possible controlling factor. Each has seen in water an opportunity to develop in importance and to direct congressional attention to its existence. That this impetuous for self-development is promoting interagency competition and jealousies seems to be immaterial.

History has shown how companies, organizations, and governments disintegrate when each department drives for its own ends rather than for the objective of the whole.

This lesson from history is applicable here. And since the executive level has failed to provide a coordinated program with efforts of each agency delineated on the basis of competency and experience, the importance of water to our continued prosperity demands congressional direction. This committee deserves our thanks for having expressed its concern over the overlapping of authorities and functions of the Federal agencies in water research rather than give an immediate endorsement to one more effort which might cause further fragmentation of responsibility.

The concerns over a lack of a national water policy are several. Of primary importance is the impossibility to definitely assign responsibility for obtaining answers to specific problems. Just as an agency can now argue that its mission includes areas of activity traditionally occupied by other agencies, it can also answer a criticism for lack of accomplishment by pointing toward other agencies which are engaged in similar pursuits and indicate that responsibility lies partially with them.

Another concern is the rampant pirating of employees by agencies. There is an acknowledged shortage of personnel qualified in water resources research aspects. Since agency accomplishment in research is defined in terms of personnel and budget, and since most agencies now can offer an applicant work in any area of personal desire, the opportunity for increasing one's income is not very restricted. Not all personnel transfers are motivated by monetary considerations. Some see other agencies developing at a faster rate than their own and want to be part of it. In other presentations an agency suggests its potential to assume leadership when personnel are available. The possibility offers a challenge to the ambitious.

This pirating of employees is not limited to the Federal agencies. While representatives of these agencies regularly complain to Congress about the differential between Federal and private industry pay scales, they ignore the differential between Federal and State levels. Agencies such as the Public Health Service, in water pollution control activity with the expressed intent of Congress to help the States, are growing by taking personnel from State agencies. Other Federal agencies have also used the State agencies as employment centers.

Yet another concern is the waste of manpower and money necessarily resulting from a program without objective or direction. Those who continually harangue the Congress and the public about a national water crisis are most vocal in promoting individual agency growth rather than interagency coordination. Individuals or organizations with specific areas of self-interest promote a public misconception of the total nature of the problem. A true appraisal would limit the scope of such self-promoting activities.

This is particularly so where efforts are made to integrate factfinding and scientific water resources investigations with law enforcement, regulation, and construction. Separation of these functions would provide two benefits: (1) Independent appraisal for Congress of the problems and possible alternate approaches to their solution, and (2) research investigations not motivated by preconceived conclusions and not subject to suppression when results are unfavorable to the enforcement, regulation, or construction agencies.

Since the authorizations of Congress to the several departments are so broad that each could take over the Government responsibility for water if it could obtain the money to do so, it is particularly important that the Congress establish a national water policy. And it is this same potential that should encourage your committee to investigate thoroughly our water resources research programs, their effectiveness and interrelationships.

Because the Congress has failed to determine whether its mandates to the several departments have been properly interpreted, the executive branch of the Government is attempting to control operations by deciding Federal policy. As an example, the Recreation Advisory Council is presently attempting to draft a circular expressing the Federal executive branch policy governing the water pollution aspects of outdoor recreation.

Under authority bestowed upon the Council by Executive Order 11017, as amended, the Council is stating the national water policy. It should be noted that this policy as now drafted does not agree with the stated intent of Congress in the Federal water pollution control law, nor as in the amendment to that law being recommended now by the Senate Public Works Committee. That the prime author of this statement is an HEW representative is obvious. And so is the fact that its acceptance will downgrade Interior agencies. And yet the nominal chairman of the Council recommendations is Secretary of Interior.

This executive branch proposed agreement should interest this committee for it directs all Federal agencies to cooperate with HEW and look to it for assistance in controls and research on water.

Problems in federally sponsored research

There are arguments, with merit, that some overlapping of research among agencies is inevitable and even beneficial. It can be argued, as the Federal Council report did, that such overlapping stems in part from the pervasive nature of the water resources problem.

But such arguments offer no answer to efforts which are manifestly directed to usurping activities of other agencies. Neither do they hold when the efforts are made to propagandize the role of an agency as one much broader in scope than intended by Congress or even practiced by the agency when the authorization was first given. An example is the Public Health Service assertion that water pollution control by that agency means that it is concerned with the total problem of water quality management.

With this interpretation there is no role for other Federal agencies without duplication. This assumption of the total perspective of water may well have been activated by an act of Congress. When the Federal Water Pollution Control Act was amended in 1961, provision was made for field laboratories and research facilities in different areas of the country for activities "relating to the prevention and control of pollution."

These laboratories were provided prior to the development of a program for each. Moreover, these laboratories were directed to be located near institutions of higher learning in which graduate training in such research might be carried out.

The PHS is responsible for a program of grants for educational institutions' research activities. The new laboratories will either assume this research work, and thus interfere with the objective of the grants, or it will have to assume activities of primary concern to other agencies.

It would be reasonable to assume both will occur. That the latter is planned is obvious from PHS reports. The new laboratory at Corvallis, Oreg., will be concerned with upstream watershed land management, the objective of the Agricultural Research Service. The PHS laboratory at College, Alaska, plans to involve itself with the permafrost studies now underway by the Geological Survey. Other acts of usurping responsibility are bound to follow. In a statement prepared by HEW on water resources research this expansion was attributed to recommendations of the Gross committee. This type of endorsement deserves congressional appraisal. It is a sad commentary that too many professional persons, while employed as consultants, will allow their names to be attributed as authors to reports drafted by the ambitious agency.

There is a growing resentment among professional people who are still of independent status, and even among those who have been party to this type of development, and a recognition that our national water development will be hindered by this approach to power. Gradually the recognition that facts must be provided in their entirety is becoming a controlling influence.

This is becoming apparent in another way—one which does have its influence on research. There is a practice by agencies concerned with regulation or construction in having other agencies, presumably proficient in factfinding in some area influenced by a project of the sponsoring agency, prepare study reports which will be offered to the Congress in an appendix to the agency report—as an endorsement of the report or as proof that another agency agrees there will be no detrimental effect of the project. For example, the Corps of Engineers or HEW may want a Geological Survey study of a project, or a fish and wildlife study on the possible effects of a project. The agency approached may feel as though the cost of such a project would approach \$100,000 to get honest answers. The sponsoring agency will provide perhaps \$25,000 and a study within that budget proceeds. This study cannot be adequate so there can be no positive assertions that the project will result in damage. Lack of such a statement is then construed as endorsement. The sponsoring agency has perpetrated a fraud on the Congress and the people; and the other agency has become an accomplice regardless of how it justifies the action.

Many of these studies should be classified as research for the answers are not known. To give such studies a limit established by one unacquainted with the needs or scope of effort necessary for answers is acceptable practice. Should research projects proposed by universities or individuals be similarly limited, there would not be such agreement to proceed.

Federally sponsored research has been growing at a pace which exceeds controls established to date. Since the research proposed in S. 2 provides in Interior a program which could be similar in many respects to HEW financed research, the HEW problems may be recalled with benefit. HEW has a committee review of proposed projects which spreads the responsibility for decision and provides HEW with an outside group of experts as the fall guys should duplication or misdirection be suggested. But not all grants seem to require this screening.

However, once the grant is issued the objective of accomplishment seems to disappear. It should interest the Congress to learn how these projects are checked and what content of reports provide. But it should be of even more interest to the Congress to learn what the extent of application of findings of this research to date has been.

Research is inherently an action with question on its results. But when an agency such as HEW expresses itself to the Congress as essential to the leadership and control of water pollution, it would not seem unreasonable to expect that there could be recommended projects which would be directed toward our daily operating needs. Instead, there is an urgent appeal for any and all ideas for research by an agency making every effort to expend the moneys given it by Congress for research.

The Sanitary District of Chicago has some 900 tons of solids to dispose of daily at a cost of \$37 a ton. The district has had to tackle its own research to solve this problem because, in the words of Vinton Bacon, the general superintendent, the PHS effort does not provide "bread-and-butter research."

While there is a drive for extending extramural research, the PHS has inhouse research in competition with it. This can be serious and affect the public. As an example, the PHS has long objected to protecting public water supplies from taste and odor by any control on odor as such. PHS argument has been that odor is too subjective. The truth is that PHS many years ago limited its vision and recommendations to one substance, phenol, which it believed to be responsible for odor. Rather than admit an error—one exposed by industrial firms concerned with effects of their wastes on public water supplies—PHS has gone to extreme limits to propose alternate approaches to measuring constituents which might cause odor. This has materially deterred pollution abatement progress. But it promoted PHS research efforts and helped convince the public more research is needed to solve the problem. PHS has not promoted outside research to solve this problem and such work as is being done is privately financed.

There is also the attendant personality problem in research. Some individuals enjoy having their names as coauthors of technical reports. Since they do not participate in the design of the project or its development, recourse is had to editing the reports as a means of claiming participation. A busy "editor" can hold up reports for months.

Needs for research and training

Research people enjoy division of their activity into three classifications:

"Pure"—finding new knowledge; "Applied"—finding applications for this new knowledge; and "Research and development"—the effort of developing pilotplant operations and making them operative on production basis.

Of these three the last claims the bulk of money allocated for research. Grants for this aspect, both public and private, have encouraged much of our growth of "research" firms—firms which are formed by or employ university professors. The university research is more nearly "pure" research.

The three aspects are needed in any program but the Congress should know how the funds are divided, and what the results are.

However, one of the objectives of the proposed water resources research bill goes beyond the ken of research and is directed toward training of scientists in fields related to water. The location of the programs at land-grant colleges, or such other institutions of learning as the State may designate, is to promote training of personnel. And yet, in the report (No. 117) of the Senate on this bill, there is a quotation (p. 7) from the Water Resources Committee of the National Academy that "the most critical shortage in the field of water resources by far is the very real shortage of broadly trained people capable of planning and executing effective research programs. At present, we have no institutional structure in the United States to take care of multidisciplinary research in water."

This need is basic. Unless it is recognized and answered, our research will continue to be as ineffective as the present HEW program. S. 2 notes that the total spectrum of influences by and on the hydrologic cycle must be included in the study (sec. 100(a)). But it should also be noted that establishment of a program in a college or university designated by the State will not per se be sufficient to provide such a comprehensive program.

Universities have of late exploited research and, in fact, have promoted the concept that their primary purpose is research with teaching a secondary objective. State universities promote their growth on size of budget, and research items are a material part of the arguments offered for increasing State appro-

priations. Since the State makes the decision on which college or university would be designated the research center, there may well be influences beyond a true appraisal of potential for providing the staff desired for a comprehensive course.

This is not a problem for simple solution but the Congress might well ask the Geological Survey, the primary agency engaged in water resources management, to outline on the basis of its experience, including that at the University of Arizona, a guideline for program development. The educators may well argue that such a guideline interferes with the role of the educators but from a practical viewpoint it should be noted that none of them have provided the guidance despite their stated appeal for such a program as essential to the Nation's development.

There is another argument for having an agency such as the Geological Survey provide guidance. The multidisciplinary attack could be directed by a "strong man" leader who provides a bias or a "committee" agreement which promotes protective compromise. This is an unpleasant view but one that deserves congressional recognition.

The bill urges more scientists to be developed but our national hysteria today is due in large measure to an inability or unwillingness of scientists to assume professional responsibility as leaders. More technicians will not answer the Nation's needs. Professional societies actually succeed in discouraging such leadership by not providing example. Concern over tax status if there is such participation removes a potential of good from the national scene. To date the societies have provided a forum for advocates of programs but have not attempted to provide leadership in evaluation of problems and solutions.

If the Congress were to invite professional agencies, Federal agencies and State and local agencies to submit questions on the aspects of water stated in section 100(a), and then request Interior through its bureaus to appraise the questions and propose projects to answer them where information is lacking, there would be both an assessment of our knowledge (which we really do not have) and an idea of what we need to know (which is now expressed only in vague generalities).

Short of this, if the Congress were to require Interior, through its bureaus, to provide an assessment of the Nation's waters in quality, quantity, and usage and to develop on an area basis an evaluation of the problems and means to accomplish their solution, our generalizations could be reduced to objectives.

But, again, any such activity by Interior must be centered in agencies concerned with factfinding and evaluation and their recommendations not be controlled by interagency committees which provide mutual protection or by agencies promoting construction or regulation projects.

The letters from the Secretaries of HEW and Agriculture in Senate Report 117 on S. 2 point up the executive level efforts to protect specific department-determined interests. Secretary Celebrezze, in fact, objects to the scope of the proposed research because it is comparable to that vested in HEW.

Actually, it should be noted that HEW authorization has been interpreted by HEW rather than explicitly stated by congressional enactment as in S. 2.

There is presently a move in the Senate (S. 649) to provide a separate administrator of pollution control in HEW. Some argue that the next step would be to have this administrator act as coordinator of all water management. There is also a rumored plan of HEW to establish 30 "colonies" or laboratories in universities for water investigations once the 7-area laboratories and 2 special quality criteria laboratories are completed. These plans would give further reason for HEW objections to S. 2.

Through all of this maneuvering and with recognition to the importance of water, Congress must remember that our greatest asset is manpower—and manpower trained in the field of water management is very limited, even more so than that which is trained in individual aspects of water.

Recommendations

The House subcommittee of the Committee on Government Operations has been successfully exposing Federal agency duplication and overlapping. The practices are long standing but have lately been increasing in magnitude.

The hearings on S. 2 by this committee have added to the knowledge of competition and duplication. In addition, attention has been redirected toward the total concept of water management, rather than to the popular concept of a problem limited to pollution abatement, and has recognized the Department of

the Interior in the role of the agency best suited to guide the Nation in wisely utilizing the resource of water.

The principal question, it seems to me, is whether this program, envisioned by S. 2, would promote water resources knowledge or add to the present inter-agency battles.

In my opinion, the answer is not simple. Passage of the bill will promote water resources development to some degree but it will add to the present inter-agency battles.

To be effective, some reorganization must be accomplished—but essential to a solution is the necessity for Congress to reassert control over the roles of the several agencies. Under a committee setup such as in Congress, this may be difficult. The need is obvious. That the effort should be expended now to accomplish it may be illustrated in another way.

Franz Jägerstätter was an Austrian peasant who refused to serve in Hitler's unjust wars. He was beheaded, but only after many tried to convince him of his hopeless position and of his responsibilities to his family and country. Shortly before he died he wrote his wife a farewell letter stating:

"Many actually believe quite simply that things have to be as they are and, if this should happen to mean that they are obliged to commit injustice, that others are responsible."

S. 2 recognizes the existence of many of the problems noted here, either by direct provision or by implication. But S. 2 as now written does not provide the control by Congress necessary to best utilize our limited manpower. To accomplish this the following recommendations are made:

If water is a resource, then jurisdiction lies in Department of Interior. If water deserves a total evaluation as proposed in S. 2, then jurisdiction for the guidance of that evaluation lies with the Geological Survey which has been established by Congress to appraise quality and quantity of this resource. This jurisdiction needs specific restatement.

If there are specific areas of concern about water, such as growth of crops and drainage from irrigation, health and disease transmission, meteorology, fisheries habitat and/or others over which specific agencies other than Geological Survey have competence and authority, these should be specifically noted.

If area laboratories are to be constructed by the Federal Government, their purpose and program should be definitely stated and jurisdiction over the laboratory given to the agency with prime responsibility for the work to be done. Otherwise, these laboratories will promote further duplication of agency work.

If research grants are to be given by the Federal agencies, there should be a limitation on the scope of projects to that of primary concern to the granting agency. There should also be an accounting to Congress of the areas of research encouraged by the agencies; the areas of research actually undertaken; the basis for making grants; the dissemination and application of findings of such research; and an accounting of moneys spent.

If agencies are to provide studies and reports for other agencies, and these reports subsequently submitted to Congress in justification of projects, there should be procedural requirements which would give the Congress information on scope and objective of the proposed report, cost and time required as estimated by the agency contacted and final agreement on time and money provided with scope of work defined.

If education of personnel trained in water management is to be accomplished in State centers of learning, there should be guidelines prepared on content of such a program since none exist today.

If the findings of the many research projects, pure and applied, by grant or by governmental agency activity, are to be useful, there must be more effective dissemination of information than is now the situation. This has been recognized in section 300 but it is doubtful whether the proposal will answer the need. The Denver Public Library has been developing a center of information in water resources literature and references. Such an agency should be encouraged since it will not only make information more readily accessible to the public but could also train personnel in handling it. But the difficulty, if not impossibility, of having all engaged in this field submit copies of reports to such a center, makes it mandatory that other approaches to disseminating information be developed.

If the Congress is to be honestly appraised of the water resources problems and possible alternate approaches to their solution, as well as areas of research need, factfinding agencies should be commissioned directly by the Congress to

evaluate such areas and report directly to the Congress. This would reduce, and hopefully minimize, the present pressures which agencies can exert on each other. In addition, the Congress should encourage the participation of professional societies in area problem evaluation to the end they promote the presentation of all the information which should be known by the Congress and the people before decisions are made. These proposals may seem idealistic but so is the image of a strong America, the home of the free. A return to the delineation of responsibilities on basis of competency will offer Americans a pride in their contribution toward keeping that image of America intact. And only the Congress can provide this reorientation. There is no better focal point for this transition than water.

Mr. ASPINALL. I also ask unanimous consent that further statements from Dr. Morgan of Colorado State University referring to some matters that came to the attention of the committee after Dr. Morgan and his associates were before the committee will be placed in the record provided they comply with the regular rules that they are acceptable to the chairman of the subcommittee and the ranking member of the subcommittee. (See p. 145.)

Is there any objection?

If not, the hearings are concluded and the subcommittee stands adjourned.

(Thereupon, at 12 noon, the subcommittee adjourned.)



LEGISLATIVE HISTORY

Public Law 88-379

S. 2

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INDEX AND SUMMARY OF S. 2

Jan. 14, 1963	Sen. Anderson and others introduced and Sen. Anderson discussed S. 2, which was referred to Senate Interior and Insular Affairs Committee. Print of bill and remarks of Sen. Anderson.
Jan. 24, 1963	Rep. Morris introduced H. R. 2683 and Rep. Teague introduced H. R. 2689 which were referred to the House Interior and Insular Affairs Committee. Print of bills.
Feb. 18, 1963	Sen. Hruska urged enactment of S. 2.
Apr. 8, 1963	Senate committee reported S. 2 without amendment. S. Report 117. Print of bill and report.
Apr. 11, 1963	Senate made S. 2 its unfinished business.
Apr. 22, 1963	Senate debated S. 2.
Apr. 23, 1963	Senate passed S. 2 with amendments.
Apr. 24, 1963	S. 2 was referred to House Interior and Insular Affairs Committee. Print of bill as referred.
Dec. 5, 1963	House sbucommittee voted to report S. 2 to the full committee.
Jan. 29, 1964	House committee voted to report (but did not actually report) S. 2 with amendment.
Feb. 10, 1964	House committee reported S. 2 with an amendment. H. Report 1136. Print of bill and report.
Feb. 25, 1964	House Rules Committee denied a rule on S. 2.
May 5, 1964	House Rules Committee reported a resolution for the consideration of S. 2. H. Res. 711. H. Report 1377. Print of resolution and report.
June 2, 1964	House passed S. 2 with amendments.
June 8, 1964	Senate appointed conferees on S. 2.
June 15, 1964	House appointed conferees on S. 2.
June 29, 1964	Sen. Jordan, Ida., replaced Sen. Allott as a Senate conferee.
	Conferees agreed to rule on report on S. 2.
June 30, 1964	House received conference report on S. 2. H. Report 1526. Print of report.
July 2, 1964	Both Houses agreed to the conference report on S. 2.
July 17, 1964	Approved: Public Law 88-379.

DIGEST OF PUBLIC LAW 88-379

WATER RESOURCES RESEARCH ACT OF 1964.

Authorizes appropriations to the Secretary of the Interior for a permanent water resources research centers in the land-grant college, or other college or university as a State legislature may designate, in each State and in Puerto Rico. Provides that each college designated shall plan and conduct competent research, investigations, and experiments of either a basic or practical nature, or both, in relation to water resources and to provide for the training of scientists through such research, investigations, and experiments. Provides that each research center shall be entitled to receive \$75,000 the first year of the program, \$87,500 the second and third years, and \$100,000 each year thereafter for water resources research. Permits two or more States to cooperate in designating a single interstate or regional research center which would receive the funds assignable to each of the cooperating States. Authorizes the appropriation to the Secretary of the Interior of an additional \$1 million in fiscal year 1965, and increasing to \$5 million in the fifth fiscal year and each year thereafter, to be available on a dollar-for-dollar matching basis to the State research centers on the basis of specific water resources research projects which could not otherwise be undertaken. Requires the Secretary of the Interior to consult with other interested Federal agencies before prescribing rules and regulations for carrying out the program, and to encourage cooperation between the research centers and Federal agencies.

Authorizes the appropriation to the Secretary of the Interior of \$1 million in fiscal year 1965 and in each of the nine fiscal years thereafter from which he may make grants, contracts, matching, or other arrangements with educational institutions (other than the colleges mentioned above), private foundations or other institutions, private firms and

individuals, and with local, State and Federal agencies, to undertake research into any aspects of water problems related to the mission of the Department of the Interior, which may be deemed desirable and are not otherwise being studied. Requires the Secretary of the Interior to obtain the continuing advice and cooperation of all Federal agencies concerned with water problems in administering the program. Provides that nothing in this Act is intended to repeal, supersede, or diminish existing authorities or responsibilities of other Federal agencies to plan and conduct research in their areas of responsibility and concern with water resources. Directs the President to establish a center for cataloging current and projected scientific research in all fields of water resources. Directs the President to clarify agency responsibilities for Federal water resources research and provide for inter-agency coordination of such research.

S. 2

IN THE SENATE OF THE UNITED STATES

JANUARY 14 (legislative day, JANUARY 9), 1963

Mr. ANDERSON (for himself, Mr. JACKSON, Mr. KUCHEL, Mr. METCALF, Mr. McGOVERN, Mr. HART, Mr. GRUENING, Mr. BURDICK, Mr. MCGEE, Mr. MORSE, Mr. ENGLE, Mr. MOSS, Mr. CARLSON, Mr. MANSFIELD, Mr. YARBOROUGH, Mr. LONG of Missouri, Mr. BAYH, Mr. HRUSKA, Mr. BARTLETT, and Mr. MCINTYRE) introduced the following bill; which was read twice and referred to the Committee on Interior and Insular Affairs

A BILL

To establish water resources research centers at land-grant colleges and States universities, to stimulate water research at other colleges, universities and centers of competence, and to promote a more adequate national program of water research.

1 *Be it enacted by the Senate and House of Representa-*
2 *tives of the United States of America in Congress assembled,*
3 That it is the policy and purpose of the Congress to assure
4 the Nation at all times an abundance of water, both as to
5 quantities and quality, necessary to meet the requirements
6 of its expanding population, and, to help achieve this objec-

1 tive, to stimulate, sponsor, and provide for the conduct of
2 research, investigations, and experiments in the field of water
3 and related resources as they affect water, supplementing
4 present programs, and to encourage the training of scientists
5 in fields related to water by assistance to colleges and univer-
6 sities in the development of water resources research
7 programs.

8 TITLE I—STATE WATER RESOURCES RESEARCH
9 INSTITUTES OR CENTERS

10 SEC. 100. (a) There is authorized to be appropriated,
11 for the fiscal year 1964 and subsequent years, for distribu-
12 tion to a college or university in each State and Puerto Rico,
13 established in accordance with an Act approved July 2,
14 1862 (12 Stat. 503), entitled "An Act donating public
15 lands to the several States and territories which may provide
16 colleges for the benefit of agriculture and the mechanic arts",
17 or such other institutions of higher education as any State
18 shall determine, a sum adequate to provide \$75,000 to each
19 State in the first year, to be increased by \$12,500 each
20 succeeding fiscal year for two years and to continue at
21 \$100,000 thereafter, for the purpose of establishing a college-
22 wide or universitywide water resources research institute,
23 center, or equivalent agency. It shall be the duty of each
24 such institute or center to plan and conduct and/or arrange
25 for a component or components of its college or university

1 to conduct competent researches, investigations, or experi-
2 ments, of either a basic or practical nature, or both, in re-
3 lation to water resources, including but not limited to aspects
4 of the hydrological cycle, supply and demand for water,
5 conservation and best use of available supplies, methods of
6 increasing such supplies, economic, legal, social, engineering,
7 recreation, biological, geographic, ecological, and other
8 aspects of water problems, as may in each case be deemed
9 advisable, having due regard to the varying conditions and
10 needs of the respective States and Puerto Rico, to water
11 research projects being conducted by agencies of the Federal
12 Government, and to those related to agriculture being con-
13 ducted by the agricultural experiment stations, and also hav-
14 ing regard to avoidance of any undue displacement of scien-
15 tists and engineers elsewhere engaged in water resources
16 research.

17 (b) There is further authorized to be appropriated to
18 the Secretary of the Interior in the fiscal year 1964 the sum
19 of \$1,000,000, increasing by \$1,000,000 each year for four
20 years to \$5,000,000 in fiscal year 1968 and thereafter, which
21 the Secretary of the Interior may use to match, on a dollar
22 for dollar basis, funds made available to State water re-
23 sources research institutes or centers by the States or other
24 non-Federal sources, to meet the necessary expenses of water
25 resources research projects which could not otherwise be

1 undertaken, including the expense of planning and coordinat-
2 ing regional water resources research projects by two or
3 more State water research agencies.

4 SEC. 101. Sums available to the States under the terms
5 of section 100 (a) of this Act shall be paid to the designated
6 institution or institutions in each State in equal quarterly
7 payments beginning on the first day of July of each fiscal
8 year upon vouchers approved by the Secretary of the
9 Interior. Each such agency authorized to receive funds
10 shall have an officer appointed by its governing authority
11 who shall receive and account for all funds paid to the State
12 under the provisions of this Act and shall make an annual
13 report to the Secretary of the Interior, on or before the first
14 day of September of each year, on work accomplished and
15 the status of projects underway together with a detailed
16 statement of the amount received under any of the provisions
17 of this Act during the preceding fiscal year, and of its dis-
18 bursement, on schedules prescribed by the Secretary of the
19 Interior. If any of the moneys received by the authorized
20 receiving officer of any State water resources research agency
21 under the provisions of this Act shall by any action or con-
22 tingency be found by the Secretary of the Interior to have
23 them improperly diminished, lost, or misapplied, it shall be
24 replaced by the State concerned and until so replaced no
25 subsequent appropriation shall be allotted or paid to such

1 States. Pending a meeting of the legislature of any State,
2 the Secretary of the Interior shall pay sums appropriated
3 pursuant to section 100 of this Act to a qualified institution
4 designated by the Governor of such State.

5 SEC. 102. Moneys appropriated pursuant to this Act
6 shall also be available, in addition to meeting expenses for
7 research and investigations conducted under authority of this
8 Act, for printing and disseminating the results of such re-
9 search, retirement of employees subject to the applicable pro-
10 visions of the Act approved March 4, 1940 (54 Stat. 39),
11 administrative planning and direction, and for the purchase
12 and rental of land and the construction, acquisition, altera-
13 tion, or repair of buildings necessary for conducting research.
14 The State water resources research agencies are authorized
15 to plan and conduct any research authorized under this Act
16 in cooperation with each other and such other agencies and
17 individuals as may contribute to the solution of the water
18 problems involved, and moneys appropriated pursuant to this
19 Act shall be available for paying the necessary expenses of
20 planning, coordinating, and conducting such cooperative re-
21 search. Two or more States may cooperate in the designa-
22 tion of a single interstate or regional research institute or
23 center.

24 SEC. 103. Bulletins, reports, periodicals, reprints of

1 articles, and other publications necessary for the dissemina-
2 tion of results of the researches and experiments, including
3 lists of publications available for distribution by the institu-
4 tions, shall be transmitted in the mails of the United States
5 under penalty indicia: *Provided, however,* That each publi-
6 cation shall bear such indicia as are prescribed by the Post-
7 master General and shall be mailed under such regulations as
8 the Postmaster General may from time to time prescribe.
9 Such publications may be mailed from the principal place
10 of business of the institute or center, or from an established
11 subunit of such agency.

12 SEC. 104. The Secretary of the Interior is hereby
13 charged with the responsibility for the proper administra-
14 tion of this Act, and, after full consultation with other Fed-
15 eral agencies, is authorized and directed to prescribe such
16 rules and regulations as may be necessary to carry out its
17 provisions, including requirement of a showing that agencies
18 designated to receive funds have, or may reasonably be
19 expected to have, the capability of doing effective work. It
20 shall be the duty of the Secretary to furnish such advice and
21 assistance as will best promote the purposes of this Act,
22 including participation in coordination of research initiated
23 under this Act by the State water resources research agen-
24 cies, from time to time, to indicate such lines of inquiry as
25 to him seem most important, and to encourage and assist

1 in the establishment and maintenance of cooperation by and
2 between the several State water resources research agencies
3 and between the State agencies and the United States
4 Department of the Interior and other Federal establishments.

5 On or before the 1st day of July in each year after the
6 passage of this Act, the Secretary of the Interior shall ascer-
7 tain as to each State whether it is entitled to receive its share
8 of the annual appropriations for water resources research
9 under section 100 (a) of this Act and the amount which
10 thereupon each is entitled, respectively, to receive.

11 The Secretary of the Interior shall make an annual
12 report to the Congress of the receipts and expenditures and
13 work of the water resources research agencies in all States
14 under the provisions of this Act and also whether any portion
15 of the appropriation available for allotment to any State has
16 been withheld and if so the reasons therefor.

17 SEC. 105. Nothing in this Act shall be construed to im-
18 pair or modify the legal relation existing between any of
19 the colleges or universities under whose direction State water
20 resources research institutes or centers are established and
21 the government of the States in which they are respectively
22 located: *Provided*, That in any State which designates more
23 than one such college or university to have a water resources
24 research center the appropriations made pursuant to section
25 100 (a) of this Act for such State shall be divided between

1 such institutions as the legislature of such State shall direct:
2 *Provided further*, That in any instance where two or more
3 States designate a single interstate or regional institute or
4 center, the funds of each of the States under section 100 (a)
5 may, upon the direction of the States, be paid to the desig-
6 nated agency.

7 TITLE II—ADDITIONAL WATER RESOURCES
8 RESEARCH PROGRAMS

9 SEC. 200. There is authorized to be appropriated to the
10 Secretary of the Interior \$5,000,000 in fiscal year 1964,
11 increasing \$1,000,000, annually for five years, and continu-
12 ing at \$10,000,000 annually thereafter from which he may
13 make grants, contracts, matching, or other arrangements
14 with educational institutions, private foundations, or other
15 institutions; with private firms and individuals; and with
16 local, State, or Federal Government agencies, to undertake
17 research into any aspects of water problems related to the
18 mission of the Department of the Interior, which may be
19 deemed desirable and are not otherwise being studied.

20 TITLE III—MISCELLANEOUS PROVISIONS

21 SEC. 300. The Secretary of the Interior shall arrange
22 for the regular advice and cooperation of all agencies of the
23 Federal Government concerned with water problems, of State
24 and local governments and of private institutions and
25 individuals, to assure that the programs authorized in this

1 Act will supplement and not duplicate established water
2 research programs, to stimulate research in otherwise neg-
3 lected areas, and to contribute to a comprehensive, nation-
4 wide program of water and related resources research. He
5 shall make generally available information and reports on
6 projects completed, in progress, or planned under the
7 provisions of this Act, in addition to any direct dissemination
8 of information by the research agencies themselves. Each
9 Federal agency doing water resources research or inves-
10 tigations shall advise the Secretary of the Interior at least
11 once annually of work underway or scheduled by it. The
12 Secretary of the Interior shall classify and maintain for
13 general use a catalog of water resources research and in-
14 vestigation projects in progress or scheduled by Federal
15 agencies, and by such non-Federal agencies of government,
16 colleges, universities, private institutions, firms and in-
17 dividuals as may make voluntarily available information to
18 him: *Provided*, That upon the establishment of a central
19 or general system of cataloging current and projected scien-
20 tific research in all fields encompassing the cataloging func-
21 tion herein authorized, the President may transfer this
22 function as he determines to be desirable.

23 SEC. 301. Nothing in the foregoing section nor in this
24 Act is intended nor shall be construed as giving its Secretary
25 or the Department of the Interior any authority or surveil-

1 lance over water resources research conducted by any other
2 agency of the Federal Government, nor shall it be construed
3 as repealing, superseding, or diminishing existing authorities
4 or responsibilities of any agency of the Federal Government
5 to plan and conduct, contract for, or assist in research in its
6 areas of responsibility and concern with water resources.

7 SEC. 302. The Secretary of the Interior is authorized
8 to establish in the Department of the Interior a Water
9 Resources Service for the purpose of administering programs
10 authorized in this Act.

11 SEC. 303. Not to exceed 4 per centum of any funds
12 appropriated pursuant to the provisions of this Act may be
13 used for the purpose of administration. The Secretary of
14 the Interior is authorized to employ a director of the Water
15 Resources Service at civil service grade 18 and, if necessary
16 to obtain personnel competent to administer a program in-
17 volving scientific knowledge and highly trained staffs, he
18 may employ not to exceed five employees above civil service
19 grade 15 in addition to the number otherwise authorized by
20 law.

21 SEC. 304. Contracts or other arrangements for water
22 resources research work authorized under this Act may be
23 undertaken without regard to the provisions of section 3684
24 of the Revised Statutes (31 U.S.C. 529) when in the

1 judgment of the Secretary of the Interior such payments
2 are necessary to facilitate such research.

3 SEC. 305. Within not more than a year following the
4 fifth year of operation of this Act, the Secretary of the
5 Interior shall prepare and submit to the President for
6 transmittal to the Senate and House of Representatives
7 a comprehensive report on progress and accomplishments
8 under the Act, together with his recommendations on re-
9 visions of the Act, and with the independent recommenda-
10 tions of the governing authorities of the State colleges and
11 universities on desirable revisions. This section is not in-
12 tended to preclude any interim recommendations deemed
13 desirable.

14 SEC. 306. This Act may be known as the "Water Re-
15 sources Research Act."

A BILL

To establish water resources research centers at land-grant colleges and State universities, to stimulate water research at other colleges, universities, and centers of competence, and to promote a more adequate national program of water research.

By Mr. ANDERSON, Mr. JACKSON, Mr. KUCHEL,
Mr. METCALF, Mr. MCGOVERN, Mr. HART,
Mr. GRUENING, Mr. BURDICK, Mr. MCGEE,
Mr. MORSE, Mr. ENGLE, Mr. MOSS, Mr. CARL-
SON, Mr. MANSFIELD, Mr. YARBOROUGH, Mr.
LONG of Missouri, Mr. BAYH, Mr. HRUSKA,
Mr. BARTLETT, and Mr. MCINTYRE.

JANUARY 14 (legislative day, JANUARY 9), 1963

Read twice and referred to the Committee on Interior
and Insular Affairs

to sleep until noon, stay out until 3 or 4 a.m., and get into trouble. Now, they tell workers, they no longer feel like bums. In addition, four of five members of different gangs—which used to meet for rumbles at night—work on the same projects without incident.

After exploring work, the youths are assigned to specific projects. Right now, they are rebuilding an old store which will be used as a neighborhood center. They are paid from a dollar to \$1.25 an hour.

Ultimately they move into on-the-job training. Jobs are contracted with private employers such as printing shops, auto parts stores and gas stations. Negotiations now are underway with Shell Oil Co., Macy's, and Beth Israel Hospital for job training. Trainees are paid the going rate for the job, with Mobilization and the employer sharing the cost.

Mobilization's job center opened October 15 and by last month 800 youths had applied for jobs. Currently, Mobilization is working with 300 of these boys on a full-time basis.

Mobilization is being financed by the city of New York, the National Institute of Mental Health, the Ford Foundation, and a \$1.9 million grant from the President's Committee.

Although other cities, such as Washington, have received grants from the President's Committee to plan programs to combat delinquency, Mobilization is the first to receive funds to translate its plans into action.

Mr. McGOVERN. Mr. President, no resource of this Nation is more precious than our young people and no problem affecting them more urgent than that of continued unemployment.

For this reason I join in sponsoring the Youth Employment Act of 1963. The goals of this legislation are clear: To unite the creation of jobs for unemployed youngsters with the need to conserve and expand our natural resources. Its provisions are sensible and thoughtfully drawn: Male citizens between 16 and 21 are to be recruited for periods of 6 months in a Youth Conservation Corps of 50,000 members—to be increased after 3 years to 100,000—who will be employed at needed conservation tasks in our Federal and State parks and forests. As in the Peace Corps, only a subsistence wage of \$70 per month will be paid these volunteers, in addition to provision for quarters, food, clothing, and medical care. Under title II of the act, young men and women will be given useful work experience, coupled with appropriate training and education, in urban areas, for example, in schools and hospitals.

Those of us who remember the dark days of the 1930's will not soon forget the splendid work performed by the young men who were enrolled in the Civilian Conservation Corps. No program of this period gained more universal approval; none inspired more hope in the hearts of youngsters for whom the future seemed forbiddingly bleak. Across this broad land today stand hundreds of living memorials to the resourcefulness and zeal of those victims of the great depression.

Today we face no comparable economic crisis. Our factories are not stilled; our consciences no longer carry the burden of city breadlines and farm revolts.

Yet the crisis for today's youth is no less real. Unemployment is the daily lot

of a million American youngsters who have left their books and classes. The number of unemployed young people continues to swell as the war babies enter the labor market. In November alone, a hundred thousand teenage boys were added to the unemployment lists and the rate of unemployment among teenagers climbed to 15.2 percent. Though the highest level of unemployment is found in the 16-to-20-age bracket, the worst is still to come. By 1965 it is estimated more than a million young Americans will be job hunting. Delinquency, already a serious problem, will loom even larger on the national horizon. No American today needs to be told of the shocking statistics on the growing number of juveniles, most of them unemployed, who commit adult crimes.

We in South Dakota are especially concerned about the problem of dwindling opportunities for our youth. Almost 10,000 South Dakotans are leaving our State each year and the great majority of them are under 35 years of age. In our State are State and National parks, reservoirs, forests, and potential recreational centers where our young people might be given suitable work. In these healthful surroundings hundreds of young Americans including South Dakotans might find employment during the difficult interlude between finishing school and finding their life's work.

Of the benefits to the boys and the Nation of this kind of outdoor experience there is no doubt. We can all agree with the conclusion of the Outdoor Recreation Resources Review Commission:

The outdoors lies deep in American tradition. It has had immeasurable impact on the Nation's character and on those who made its history. When an American looks for the meaning of his past, he seeks it not in ancient ruins, but more likely in mountains and forests, by a river, or at the edge of the sea. Today's challenge is to assure all Americans permanent access to their outdoor heritage.

No social legislation in this session of Congress is more vital to the welfare of the Nation than this bill.

ESTABLISHMENT OF WATER RESOURCE CENTERS AT CERTAIN COLLEGES

Mr. ANDERSON. Mr. President, I send to the desk for appropriate reference a bill to establish water resources research institutes or centers at land grant colleges and universities, to stimulate water resources research at other institutions of higher education, and to promote a more adequate national program in this field.

I request unanimous consent that the bill lie on the desk for 3 days to permit any Senators who wish to do so to join in coauthorship of the measure.

The first draft of this bill was introduced in the 87th Congress on July 27 of last year. I then announced that it was introduced for the purpose of study, to stimulate discussion, obtain the views of the agencies in the executive branch of the Government, and to become a vehicle for the preparation of a revised bill for presentation to this Congress.

The response to the study bill has been a stimulating experience.

Comments and suggestions have come from every corner of the country and they have been almost invariably constructive. Many have been incorporated in the revision. Without any exception, the basic plan in the bill to stimulate water resources research in colleges and universities, where it will help to produce much-needed, highly trained personnel in the water field, has been warmly endorsed and supported.

The principle of multidisciplinary, or collegewide agencies has received general endorsement.

The sums proposed to be authorized for the research programs have not been criticized. We have been advised that they are modest in comparison to expertly estimated needs for college and university located research on water problems, but not so modest that they will not permit substantially adequate beginnings of a program which is expected to stimulate and attract matching funds from other sources.

Before dealing in greater detail with this water resources research bill, we should review briefly where we stand as this session of Congress opens in relation to water resources to meet the Nation's growing needs.

In January 1961, under the leadership of the greatly missed Senator from Oklahoma, Robert S. Kerr, the Senate Select Committee on National Water Resources warned us in its final report that we will have abundant water supplies in the years ahead only if we conserve them and manage them wisely.

Full development of all available supplies is going to be necessary to meet the needs in 1980 of five major river basins, or areas: the South Pacific area in California, the Great Basin in Nevada, the Rio Grande-Pecos, the Lower Colorado, and the upper Missouri River Basins.

Another three great water areas will be at the limit of their supplies, with full development, by the year 2000. This group includes the western Great Lakes area composed of Michigan, northern Indiana, most of Illinois, and eastern fractions of Wisconsin and Minnesota. It also includes the western gulf area in Texas, and the upper Arkansas-Red River Basins involving major parts of Colorado, Kansas, and Oklahoma, and smaller sections of northeastern New Mexico and northern Texas.

Briefly, by the year 2000 the western half of this Nation excepting the upper Mississippi, the immediate Mississippi River drainage area, the lower Missouri and the Columbia River Basin will have come to the end of presently available water resources. The rest of the Nation will be struggling with conserving, purifying, recycling, and transporting water to points of need with investments in water facilities running well over 10 or 15 billion 1961 dollars per year.

Some of us are right now at the bottom of the barrel. The San Juan-Chama project in New Mexico will develop our last major available water supply unless and until we can purify brackish waters.

In Arizona, 60 percent of water needs are being met from ground water sources which are being pumped out far faster than they are replenished. Southern California is now importing water, planning to import more from the northern end of the State, and hoping the Supreme Court will permit it to have more from the Colorado River Basin despite an adverse report of the Court's Master in the case.

Totally, America has an abundance of water to meet her needs for centuries to come if the water and population are managed right. It will require enormous investments, at best, to manage properly. We are right now eyeball-to-eyeball with shortages, and in many areas we cannot afford enough time to blink. We must invest in water development and research or stagnate.

The Select Committee on National Water Resources, on which I had the honor to serve with Senators Kerr, Murray of Montana, Chavez, Ellender, Magnuson, Jackson, Engle, Hart, McGee, Moss, Kuchel, who was vice chairman, Young of North Dakota, Schoepfel, Case of South Dakota, Martin of Iowa, and Scott of Pennsylvania, made five recommendations. These included:

First, development of comprehensive water development and management plans for every major river basin in the United States by 1970.

Second, a 10-year program of financial aid to States to help them become active participants in the big planning job.

Third, a greatly expanded and comprehensive Federal program of scientific research on water, probing ways both to increase our supplies and to increase the efficiency of our use of available supplies.

Fourth, preparation of a biennial Federal assessment of the water demand-supply situation in each of the water resource regions of the United States so we will know where we stand, starting this year.

Fifth, Federal-State cooperation in a program to encourage efficiency in water development and use.

President Kennedy took the initial steps to implement these recommendations during his first month in office. In February 1961, in his resources message, he advised that he had asked the National Academy of Sciences to give him a report on the situation in respect to scientific research on all natural resources. He had also asked the Council on Science and Technology to provide an interim report on water research.

In July of the same year—1961—he sent to Congress a draft of a Water Resources Planning Act to provide the machinery for development of major river basin plans by 1970, and to provide the recommended aid to the States for participation in planning work.

Despite a great divergence of views about who should do our river basin planning, and a feeling in many quarters that agency and departmental competitions in the water field make the achievement of the task of coordinated planning in a reasonable period of years absolutely impossible, I have a great deal more than bare hope that the 88th Congress of the United States will solve

this puzzle and get such planning under way on the basis of President Kennedy's bill.

The Interior and Insular Affairs Committee sat jointly with the Public Works Committee in hearings on the President's planning and State aid proposal in 1961. There was opposition to it from those who insist that State water rights are paramount to Federal rights—or should be. The situation did look hopeless, but the Interior Committee has persisted in an effort to reach agreement with the States on a mechanism for planning which will avoid the State-Federal rights issue. I appealed to Gov. Nelson Rockefeller, of New York, at one point in this effort to help end the impasse between Federal and States rights advocates which has existed since President Teddy Roosevelt's Inland Waterways Commission recommended comprehensive Federal planning in 1908.

A series of conferences between representatives of the Interstate Commission on Water Problems of the Council of State Governments and of our committee has ensued. Modifications of President Kennedy's proposal for basin planning commissions have been developed which I have reason to hope will find broader acceptance than any previous draft. There should consequently soon be before this Congress a revision of S. 2246 of the 87th Congress, intended to implement recommendations Nos. 1 and 2 of the Select Committee on National Water Resources and the President's proposal to get planning started.

We are not going to drop the effort to achieve orderly water resources planning. Wise management of the water resources of our planet is fully as important as exploring space. Both are going to be top priority concerns of mine in this Congress.

The bill I have just introduced, the water resources research bill, is intended to contribute to the implementation of the Select Committee's third recommendation—a comprehensive Federal water research program.

So there will be no continuing misunderstanding of the bill, as is reflected in one departmental report on S. 3579, it should be clearly understood that the measure does not propose a total Federal water research effort and no such claim is made for it.

The bill proposes Federal financial assistance to land-grant colleges and universities or other competent higher educational institutions in each State, as the State determines, to establish a universitywide water resources research institute or center, in the general pattern of the Hatch Act of 1887 which authorized the agricultural experiment stations. Each State center will be entitled to \$100,000 annually on a continuing basis, plus matching funds for specific research or experimental projects. The Secretary of the Interior is also authorized to make grants, matching agreements and contracts with other colleges, and universities, States and other governmental agencies, private foundations and other institutions, firms and individuals, to conduct water research projects within the scope of the Department

of Interior's mission in the water field. Appropriation of \$5 million in the first fiscal year, increasing to \$10 million over the next 5 years, would be authorized.

The program does not meet the need for expansion of direct Federal research work on important water problems like pollution control, weather modification and saline water conversion, nor the need for the Departments of the Federal Government, other than Interior, to use the colleges and universities on research projects in their fields of responsibility. Just as the agricultural experiment stations supplement Federal agricultural research at Beltsville and many other direct Federal agricultural laboratories and research centers, the water research program proposed in this bill would supplement present programs of Federal agencies, not supplant them.

When I introduced the original draft of the bill, I said:

The proposal is not a solution to all water resources research problems. It will make a great contribution both to the assurance of adequate water supplies and the advancement of our scientific knowledge but there will be a continuing necessity for special Federal water research programs such as the present saline water and pollution control work. There will be need for intensified fundamental scientific research into the nature of this element, and into every aspect of the hydrologic cycle, not only in the colleges and universities, but wherever competent scientists can be enlisted and supported in the work.

This bill proposes what I believe will become a very important part of the sort of national water research program called for by the Senate Select Committee on National Water Resources in its 1961 report, but only one part of it.

Other parts of my explanation of the original bill are equally pertinent to the present bill.

Mr. President, I ask unanimous consent to have printed in the *RECORD* at the conclusion of these remarks, excerpts from that original statement of July 27, 1962. Repetitive portions will be deleted.

The VICE PRESIDENT. Without objection, it is so ordered.

Mr. ANDERSON. Mr. President, in my original remarks, I included statements from a number of eminent educators and scientists in regard to some of its major features.

They include the findings of a symposium of engineers that water research involves many fields of knowledge—mathematics, physics, chemistry, geology, meteorology, statistics, bacteriology, biology, geography, soil, science, agriculture, forest management, law, economics, public administration, political science, medicine and sociology. This listing supported the finding that water research must be interdisciplinary, with highly trained men available from a broad array of fields.

Dr. Joseph L. Fisher of Resources for the Future, and Dr. John C. Geyer of the Department of Sanitary Engineering and Water Resources at Johns Hopkins University are quoted on the need for more scientists—social as well as physical scientists—working in the water field. Together with Dr. Carl E. Kindsater of the University of Georgia, they support the urgency and great value of combining

research and education to bring about the training of much-needed scientists specializing in water problems.

The original endorsements of the basic objectives of this water resources research proposal could now be extensively supplemented from the reports of the executive agencies on S. 3579, from the findings of educational and scientific bodies who have independently made recommendations paralleling S. 3579 since its introduction, and from communications about the proposal from people with knowledge of our critical water situation.

I shall cite some of these supporting statements which are pertinent to features of the bill which have been, and will doubtless be debated further, during its consideration.

It has been suggested that regional, rather than State, water research centers would be adequate and that in some instances other than land-grant institutions should be designated as the home of the State water research agency.

The original bill provided that funds for a center should go to a land-grant college or university, or "such substantially equivalent arrangement as the State shall determine." That has been changed in the current draft to specify a land-grant institution or "other institution of higher education as the State shall determine." This is intended to make clearer that the State may designate whatever college or university it considers best to conduct interdisciplinary water research work. The new draft is further amended to authorize, but not require, two or more States to join in a single interstate or regional water research agency if they desire to do so.

There should be such discretion in the bill, but I am prepared to defend, with the backing of some outstanding authorities, the wisdom of staying close to the pattern of the Hatch Act of 1887—the Agricultural Experiment Station Act—which authorized the establishment of experiment stations at the land-grant school in each State.

Report No. 1 of the President's Science Advisory Commission on "Meeting Manpower Needs in Science and Technology," declares:

Additional first-rate educational opportunities should be located in such manner as to serve all geographic areas more effectively. Centers of excellence serving more regions and States would stimulate and spread economic progress because, as recent experience has shown, industry tends to concentrate around leading institutions of science and technology. In addition to enlarging present programs, special arrangements will be required to assist areas of the country which now possess inadequate foundations for an effective graduate education program.

The President's Committee also found:

Nowhere are the benefits of scientific research more dramatically revealed than in food production. Fifty years ago in this country an agricultural worker produced food for only 3 or 4 others in contrast to his capability to feed 27 individuals today.

This accomplishment can be directly attributed to research that has been systematically supported by the Federal Govern-

ment, the States, and private sources, in programs that have historically and effectively linked education and research. As a consequence, universities have been eminently able to meet changing needs.

The universities to which this comment alludes, are, of course, the land-grant institutions proposed to be activated in the water field by the bill I have introduced. The program of systematic Federal, State, and private support effectively linking education and research to which our great success in the food field is attributed is the exact pattern which would be established in the water resources field by the measure I have presented, for the language of the Water Resources Research Act is the language of the Hatch Act which started the agricultural experiment station system.

In the field of water research, the proposed act would spread centers of competence to serve the needs of the States on the same pattern which the President's committee found the most outstanding example there is of the benefits of scientific research.

The Committee on Natural Resources of the National Academy of Sciences—National Research Council, in its study of the status of natural resources research for the President, has come to the conclusion that—

In adapting their research programs and activities to the requirements of the problems outlined in this report, governmental and nongovernmental agencies and institutions should take full advantage of the resources of the universities, contracting out especially those studies for which the universities are uniquely equipped. It should be remembered that an important byproduct of the university research is the training that accompanies it, and the committee re-emphasizes the need for training research workers to deal effectively with the problems relating to natural resources. These problems require closer cooperation between natural and social scientists.

The National Science Foundation group concluded that the Federal Government should "enlist the potentials of land-grant institutions" and that—

These institutions should be encouraged to extend their interest to cover the total span of natural resources, particularly as they relate to the future well-being of the areas they serve. For example, these institutions in the coastal States could develop fisheries experiment stations similar to the agricultural experiment stations which have so successfully aided the development of agriculture in the United States.

The faculties of these universities should be called upon to serve as advisers and assistants to local and State agencies with responsibilities for resource development, planning, and management.

It is appropriate to repeat at this point that one of the facts which stimulated the original concept of S. 3579 was the Interior Committee's finding, during a committee survey of current water research and study activities, that the States, in their efforts to meet pressing water problems, are already calling on land-grant college and university faculty members for help and advice.

As the cooperative Federal-State water resources planning work recom-

mended by the Senate select committee, and by the President, gets underway—and there is going to be water planning because of the pressure of requirements whether Congress provides an orderly method or it has to be a patchwork job—State and local officials throughout the Nation are going to have increased need for such advice and assistance.

The conclusions of the National Academy study and of the President's Science Advisory Committee that we need more centers of competence, and that they should be available to aid State and local needs, are sound and strongly support the soundness of assistance to each State, to provide itself with the services of a water resources research center.

There are a great many water problems that are of interstate, regional, national, and even worldwide in character, such as saline water conversion and pollution. The soap companies sell detergents everywhere. The chemistry and the physical characteristics of the element itself are the same in New York and California, regardless of which is the bigger State. They are the same on all of the continents of the world, and much of the knowledge we gain through water research will have value in our international relationships.

But water problems also vary with every difference in the environment in which the water occurs. Environment varies with the nature of human habitation and use in the area in which it occurs, with climate, with topography, elevation, vegetative cover, or lack of it, geology and scores of other factors.

There is fully as much variation in problems, and therefore justification and need for water resources research centers by States as there was and is for the agricultural experiment stations which have had such phenomenal success.

Another point of considerable discussion concerning this water research proposal has been the scarcity of hydroscintists. Fear has been expressed that the new State centers will enlist and draw scarce manpower away from useful water research work now in progress.

There are not going to be 50 water research centers set up suddenly a week after this measure passes Congress and is signed. There must first be appropriations. The States must designate colleges and universities to establish centers, or institutes. The institutions designated will have to develop plans for competent and useful research having regard, under the terms of this revised bill, to the avoidance of any undue displacement of scientists and engineers elsewhere engaged in water resources research.

Development of the centers will come over a period of several years. It may not require 25 or 30 years, as in the case of agricultural experiment stations, but it would not all happen in 1 year. Department of Interior estimates, in its report on S. 3579, indicate that the programs will still be somewhat below maximum authorizations in the bill after 5 years.

Engineers, hydrologists, and physical scientists will not be required for all of the projects undertaken, nor for all of the tasks of training needed personnel which are involved. Water problems are social as well as physical. There is a great deal we need to know about the economic value of water in alternative uses, about the suitability and adequacy of our divergent systems of riparian and appropriation rights in water law, about the efficiency and effectiveness of the social and political institutions which administer water, the social and economic objectives of water resources development, the economic effects of interbasin transfers, the potentialities of flood plain zoning, methods of evaluating the use of water for recreation and scenic preservation, and a great many other matters outside the field of physical sciences. Many questions outside hydrology and engineering will arise in the process of planning river basins for optimum use, as we are committed to do.

We are assured that there are a great many highly trained members of the faculties of colleges and universities, trained in both the social and scientific disciplines involved in water problems who, although not classified as hydroscintists, can be enlisted to specialize on work related to water and to conduct water related research, and direct and train students in such work. A great deal of effective and competent work can be accomplished in the period in which additional pure hydroscintists are being trained, which will also contribute to their training.

The University of New Mexico has just published a very valuable study of the comparative economic values of water in alternative uses directed by Dr. Nathaniel Wollman, an economist.

The study indicates that water from our San Juan-Chama project used for recreation will add four to five times as much to the State's gross product as water used in agriculture. Water used by industry will increase gross State product 12 to 15 times more than use in recreation. A new mix of water uses is clearly in order.

Traditional social and economic concepts about water have been shaken not only in New Mexico, but in all water-short areas by the study. Things we have suspected have been factually demonstrated. A great deal of research, restudy, and replanning of water developments will need to be done to assure optimum use. There is need for research into our institutional arrangements for the transfer of water between uses. Standards and criteria for the justification of water projects must be reviewed. Repayment arrangements and pricing schedules will need restudy.

In its summary report on "Natural Resources Research" which was issued January 9, the National Science Foundation-National Research Council says in regard to water:

Systems research directed toward simultaneous evaluation of combinations of alternative uses, operating procedures, and physical structures would greatly benefit all agencies having responsibility for regional and water basin developments. This re-

search must utilize social as well as physical data and thus will require programs of supporting research in the social sciences as well as the physical sciences and engineering.

Any argument that we do not have adequate trained personnel to attack water problems competently and fruitfully in a very considerably expanded research program is necessarily based on a narrower concept of the nature of problems which need to be studied than the reality.

Mr. President, the reports of the executive agencies have almost unanimously endorsed the basic objectives of S. 3579. Nearly all have made suggestions for amendments. Many of them have been incorporated in the draft I have just introduced. A few have not. All will be considered, of course, in committee hearings and executive sessions on the measure.

The major departmental reports have reached the committee since the new year so there has not been time to consider all suggestions for revision as carefully as will be done with more time.

The reports, and nongovernmental endorsements of the basic program proposed in S. 3579, are convincing that the measure deserves the attention and study of the Congress.

The Department of the Interior has "strongly recommended enactment of this legislation."

The Secretary of the Army has raised several questions in regard to S. 3579, which have been clarified in the new measure, but reports:

The Department of the Army believes that an expansion of State research in the water field, supplementing and complementing the water research of the Federal agencies, would be desirable. Moreover, it is believed that an increase in the grants which the Federal Government now makes to the States to encourage research would be justified by the benefits which would accrue to the Nation as a whole. Hence the basic objective of S. 3579 has the full support of the Department of the Army, on behalf of the Department of Defense.

The Federal Power Commission asked that the measure be amended to assure that "other interested Federal agencies", as well as departments involved in water programs, are advised and consulted. After explaining the Commission's interest in hydroelectric power development and multiple-purpose planning of river basins, Chairman Joseph C. Swidler states:

The Commission favors enactment of legislation that would accomplish the objectives of this bill.

The Tennessee Valley Authority, while raising the question of using regional instead of State research centers, reports:

We strongly subscribe to the bill's objective of encouraging research relating to the conservation, development and more effective use of our water resources. We believe that the proposal to make greater use of our colleges and universities in such a program is sound, not only as a means of acquiring needed technical assistance for research but also as a means of increasing the general interest of the colleges and universities in our water resources. We believe also that the problems in this field are so broad in scope and of such national importance

that the Federal Government should provide direction and financial assistance in the efforts to solve them.

In his report on S. 3579, Dr. Jerome Weisner, the President's science adviser and Director of the Office of Science and Technology, prefaces his specific suggestions with this comment:

Legislation along the general lines of the bill could serve a useful purpose in providing additional authority and funds for a concerted approach to the problems in the field of water resources research. To carry out the additional research in water resources needed to assure an abundance of water of adequate quality requires augmentation of research in the universities to more effectively utilize their research potential, to bring to bear the several interrelated disciplines bearing on water resources, and to train the new scientists and engineers sorely needed for research and teaching in this field.

Some half dozen Federal departments and agencies have major responsibilities in water resources requiring research. They support research in their own laboratories and in the universities in accordance with their missions. The extent of such support is quite modest in relation to the needs for better understanding of the problems involved. Shortages of highly trained manpower would particularly limit the expansion of creative research in this field even if more funds were made available. There are many different kinds of research needed in water resources ranging from basic scientific research, on the one hand, to applications engineering and economic analyses on the other. There is a special need for research and analysis that draws on the combined talents of scientists, engineers, social scientists, economists, lawyers and others. There is also a need at local levels for technical analyses and studies to apply the findings of research. The research problems may be national or highly local in character.

As I perceive the broad objective of legislation along the lines of the bill, it should be aimed at supplementing existing agency arrangements for support of water resources research by fostering university-planned and initiated research and investigation that draws on the diverse scientific, technical and other skills throughout the schools and departments of the university or college; that is directed at State, regional or national water resources problems; and that is not shaped by the mission of a particular Federal agency providing financial support. Federal support of a program of this nature would need to be administered in the broad national interest and in the interests of all the Federal agencies having missions in water resources.

I would hope that the flavor of the foregoing remarks could better be reflected in your bill so that there would be no misunderstanding as to its objective to supplement existing forms of support in certain important respects. On the other hand, by strengthening and expanding university- and college-wide capabilities for water resources research, additional research potential would be made available to all of the interesting Federal agencies.

The report of the Bureau of the Budget identifies that agency with Dr. Weisner's report and specific suggestions made in subsequent portions of his letter.

Much of the suggested flavor, as well as most of the specific modifications, which Dr. Weisner recommended, will be found in the new draft of the proposed legislation.

A point of concern emphasized by the Budget Bureau concerned coordination. Language in S. 3579 which directed the Secretary of the Interior to encourage a coordinated Federal water research program has been deleted. The word "encourage" was disregarded and the clause aroused the fears of some departments that Interior might be getting some surveillance over them. No such authority was intended. It is disclaimed in the new draft in a proviso so extensive and explicit it should end all fears.

The Executive Office of the President is working toward coordination of water resources research through the Office of Science and Technology. The Water Resources Planning Act, previously discussed, will provide coordination in the water planning field through the proposed Federal Water Resources Council, composed of the Secretaries of the Interior, Agriculture, Army, and Health, Education, and Welfare. Coordination of both planning and research is needed and can wisely be provided in the manners intended. It is neither attempted nor intended in this Water Resources Research Act.

Because administration of the proposed research program as a supplement to present work will require that the Department of the Interior know of research projects in progress and planned throughout the Government, provision is made for the Department to be advised of research projects underway and planned by all of the Departments. Since it will have this information at hand if the measure is enacted, it is further directed to make up a file, or catalog, of all the Federal projects for public as well as departmental use.

This is a bookkeeping function—not coordination. It is needed. It took our committee months to gather together data on water resources projects underway within the Federal Government last year. It is already out of date. The bill I have proposed provides for the Department of the Interior to maintain a catalog of projects on an interim basis and authorizes the President to transfer it as he determines wise upon the establishment of a central catalog on scientific research, or an overall program for keeping such information available.

It has been gratifying that a number of major groups concerned with our water resources have endorsed S. 3579 directly, or in terms of its objectives.

The Association of State Universities and Land-Grant Colleges adopted two resolutions in respect to S. 3579, one originating in its committee on water resources. The second was offered by its engineering division.

Mr. President, I ask unanimous consent to include in my remarks at this point the two resolutions approved by the association at its convention here November 12 and 13.

The VICE PRESIDENT. Without objection, it is so ordered.

The resolutions are as follows:

REPORT FROM THE COMMITTEE ON WATER RESOURCES OF THE ASSOCIATION OF STATE UNIVERSITIES AND LAND-GRANT COLLEGES

The water resources committee also considered the proposed legislation known as the Anderson bill, S. 3579. The committee endorses S. 3579 as recognizing problems of extreme national concern. For many years, the land-grant institutions through their research and education capabilities have been working on these problems. However, the Anderson bill provides the mechanism for them to take a concerted national action through—

(a) Providing for the establishment of universitywide water resource research institutes or the equivalent.

(b) Providing continuing financial support for research on the water resources problem.

The water resources committee believes that the Anderson bill is to be commended particularly for its forward-looking proposals in five areas:

(1) It identifies the need for basic research and a focus of multidiscipline capabilities on the water resources problem.

(2) It recognizes the need for local and regional centers of interest and activity on water resources problems.

(3) It provides a mechanism for increasing the supply of highly educated manpower capable of dealing with water resources problems.

(4) It provides for a realistic combination of funds for continuing research programs with funds for grants and contracts on a short-term, special-project basis.

(5) It creates a channel that does not now exist through which a Federal Government agency and the educational institutions of America can mutually advance the national interests in a key resources area.

The water resources committee suggests that, if practical, the language of the bill should be amended to give consideration to the following suggestions:

(a) That matching of Federal funds by the States under section 100(b) be on a dollar-for-dollar basis.

(b) That for clarity, section 106 be placed under title III.

(c) That provision for continuation of title II funds beyond 1969 be included.

(d) That the Service should use consultants and advisory boards to the fullest extent practical in identifying the research problems of most importance to be financed by title II funds.

Approved, water resources committee, November 11, 1962.

W. E. MORGAN,
Chairman.

Approved by the Senate of the Association of State Universities and Land-Grant Colleges, November 13, 1962.

RESOLUTIONS FROM THE ENGINEERING DIVISION, ASSOCIATION OF STATE UNIVERSITIES AND LAND-GRANT COLLEGES

The Engineering Division of the Association of State Universities and Land-Grant Colleges heartily endorses S. 3579, the Anderson bill, and supports its enactment. The bill is commended for its proposals to establish State water resources research institutes, to provide funds for both continuing research programs and project research, and to establish a Water Resources Service in the Department of the Interior. The division believes that engineering research and education have much to offer to this proposed coordinated effort to focus the strength of educational institutions on the water resource problem. The member schools of engineering of the division look forward to participating in the proposed universitywide efforts. The division believes that

passage of the Anderson bill will open up a much-needed channel for cross-fertilization between programs of the Department of the Interior and those of educational institutions. Copies of this resolution are to be sent to Senator ANDERSON, the Department of the Interior and the Office of Science and Technology.

Approved, engineering division, Nov. 12, 1962.

J. D. RYDER,
Secretary.

Approved by the Senate of the Association of State Universities and Land-Grant Colleges, Nov. 14, 1962.

Mr. ANDERSON. Mr. President, I ask unanimous consent also to include at this point in my remarks a resolution adopted by the Interstate Conference on Water Problems of the Council of State Governments at its annual meeting in Chicago on Dec. 5, 1962.

The VICE PRESIDENT. Without objection, it is so ordered.

The resolution is as follows:

RESOLUTION ADOPTED BY THE INTERSTATE CONFERENCE ON WATER PROBLEMS OF THE COUNCIL OF STATE GOVERNMENTS REGARDING WATER RESOURCES RESEARCH

Whereas the constantly increasing demand upon the Nation's water resources necessitates an immediate and pronounced acceleration of water resources research; and

Whereas the States have a responsibility to aid in the solution of problems requiring research; and

Whereas there was introduced in the 87th Congress legislation which could be helpful in promoting such research and in assisting the States in discharging their responsibilities: Now, therefore, be it

Resolved by the Interstate Conference on Water Problems meeting in Chicago, December 5, 1962, That the States are urged to increase their support of coordinated programs of water resources research; and be it further

Resolved, That the Congress is urged to give favorable consideration to legislation providing for distribution of sums for research in furtherance of programs developed by a qualified college or university in each State and Puerto Rico, or such other substantially equivalent arrangement as the State may determine, such distribution to be made only after consultation with the Governor or appropriate State agency as the Governor may direct and for programs of coordinated research or for programs which are compatible with coordinated research programs.

Adopted, Chicago, Ill., December 5, 1962.

Mr. ANDERSON. Mr. President, I have today received a letter from the American Society of Civil Engineers saying that the "society believes that enactment of legislation along the general lines of this bill (S. 3579) would advance its aims in the field of water related research."

Mr. President, I ask unanimous consent to include the society's letter, signed by Mr. William H. Wisely, in the RECORD.

The VICE PRESIDENT. Without objection, it is so ordered.

The letter is as follows:

AMERICAN SOCIETY OF CIVIL ENGINEERS,
January 10, 1963.

HON. CLINTON P. ANDERSON,
Chairman, Committee on Interior and Insular Affairs, U.S. Senate, Washington, D.C.

DEAR SENATOR ANDERSON: The American Society of Civil Engineers has a continuing

interest in all aspects of national water policy. On the basis of its study of all aspects of water problems, the society is convinced of the need for an increase in research in civil engineering fields related to water resources.

It is the thoughtfully considered viewpoint of this society that support should be given to the general principle of Federal-State participation in such research. Furthermore, it is essential that provision be made for better coordination of research and educational approaches to the development of water resources.

In recent months, note has been taken of the prospect of establishment of water resource institutes at each land-grant college, through the enactment of S. 3579 of the 87th Congress. The society believes that enactment of legislation along the general lines of this bill would advance its aims in the field of water-related research.

It is hoped that there will be an appropriate time and place for full discussion of future policies for water resources research. At such time, well-qualified and informed officers and members of this society would welcome the opportunity to elaborate upon this brief statement.

Cordially,

WILLIAM H. WISELY,
Executive Secretary.

Mr. ANDERSON. Mr. President, I ask unanimous consent that a resolution adopted by the Policy and Coordinating Committee on Water Resources of the University of Idaho may be printed in the RECORD.

The VICE PRESIDENT. Without objection, it is so ordered.

The resolution is as follows:

RESOLUTION ON S. 3579 BY THE POLICY AND COORDINATING COMMITTEE ON WATER RESOURCES OF THE UNIVERSITY OF IDAHO

Whereas Senate bill 3579 which is better known as the Water Resources Research Act submitted by Senator ANDERSON, of New Mexico, is now before the Congress; and

Whereas this bill is designed to establish a water resources research institute at the various State universities to promote a more adequate national program of water research and to train competent personnel in fields related to water resources; and

Whereas the University of Idaho through its policy and coordinating committee on water resources is dedicated to assisting in formulation of coordinated research and planning for the development of the water resources of the State of Idaho and is interested in a coordinated water resources policy and program for the Nation; and

Whereas the University of Idaho recognizes that the manner in which we utilize and develop water resources will influence our health, security, economy and well-being for all time, and as such, support from this act would help to meet the needs of the University of Idaho and the Nation as a whole; and

Whereas it is the considered judgment of the policy and coordinating committee on water resources and its advisory committee, as listed below, that the bill is in the best interest of the University of Idaho, the State of Idaho, and the Nation that the proposed legislation be enacted: Now, therefore, be it

Resolved, That the congressional delegates from the State of Idaho and the Governor of the State of Idaho use their good offices to lend their support and endeavor to obtain the adoption of the Water Resources Research Act, Senate bill 3579.

Mr. ANDERSON. Mr. President, I ask unanimous consent that the bill be printed in the RECORD.

The VICE PRESIDENT. The bill will be received and appropriately referred;

and, without objection, the bill will be printed in the RECORD.

The bill (S. 2) to establish water resources research centers at land-grant colleges and State universities, to stimulate water research at other colleges, universities and centers of competence, and to promote a more adequate national program of water research, introduced by Mr. ANDERSON (for himself and other Senators), was received, read twice by its title, referred to the Committee on Interior and Insular Affairs, and ordered to be printed in the RECORD, as follows:

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That it is the policy and purpose of the Congress to assure the Nation at all times an abundance of water, both as to quantities and quality, necessary to meet the requirements of its expanding population, and, to help achieve this objective, to stimulate, sponsor, and provide for the conduct of research, investigations, and experiments in the field of water and related resources as they affect water, supplementing present programs, and to encourage the training of scientists in fields related to water by assistance to colleges and universities in the development of water resources research programs.

TITLE I—STATE WATER RESOURCES RESEARCH INSTITUTES OR CENTERS

SEC. 100. (a) There is authorized to be appropriated, for the fiscal year 1964 and subsequent years, for distribution to a college or university in each State and Puerto Rico, established in accordance with an Act approved July 2, 1862 (12 Stat. 503), entitled "An Act donating public lands to the several States and territories which may provide colleges for the benefit of agriculture and the mechanic arts", or such other institutions of higher education as any State shall determine, a sum adequate to provide \$75,000 to each State in the first year, to be increased by \$12,500 each succeeding fiscal year for two years and to continue at \$100,000 thereafter, for the purpose of establishing a collegewide or universitywide water resources research institute, center, or equivalent agency. It shall be the duty of each such institute or center to plan and conduct and/or arrange for a component or components of its college or university to conduct competent researches, investigations, or experiments, of either a basic or practical nature, or both, in relation to water resources, including but not limited to aspects of the hydrological cycle, supply and demand for water, conservation and best use of available supplies, methods of increasing such supplies, economic, legal, social, engineering, recreation, biological, geographic, ecological, and other aspects of water problems, as may in each case be deemed advisable, having due regard to the varying conditions and needs of the respective States and Puerto Rico, to water research projects being conducted by agencies of the Federal Government, and to those related to agriculture being conducted by the agricultural experiment stations, and also having regard to avoidance of any undue displacement of scientists and engineers elsewhere engaged in water resources research.

(b) There is further authorized to be appropriated to the Secretary of the Interior in the fiscal year 1964 the sum of \$1,000,000, increasing by \$1,000,000 each year for four years to \$5,000,000 in fiscal year 1968 and thereafter, which the Secretary of the Interior may use to match, on a dollar-for-dollar basis, funds made available to State water resources research institutes or centers by the States or other non-Federal sources, to meet the necessary expenses of

water resources research projects which could not otherwise be undertaken, including the expense of planning and coordinating regional water resources research projects by two or more State water research agencies.

SEC. 101. Sums available to the States under the terms of section 100(a) of this Act shall be paid to the designated institution or institutions in each State in equal quarterly payments beginning on the first day of July of each fiscal year upon vouchers approved by the Secretary of the Interior. Each such agency authorized to receive funds shall have an officer appointed by its governing authority who shall receive and account for all funds paid to the State under the provisions of this Act and shall make an annual report to the Secretary of the Interior, on or before the first day of September of each year, on work accomplished and the status of projects underway together with a detailed statement of the amount received under any of the provisions of this Act during the preceding fiscal year, and of its disbursement, on schedules prescribed by the Secretary of the Interior. If any of the moneys receive by the authorized receiving officer of any State water resources research agency under the provisions of this Act shall by any action or contingency be found by the Secretary of the Interior to have been improperly diminished, lost, or misapplied, it shall be replaced by the State concerned and until so replaced no subsequent appropriation shall be allotted or paid to such States. Pending a meeting of the legislature of any State, the Secretary of the Interior shall pay sums appropriated pursuant to section 100 of this Act to a qualified institution designated by the Governor of such State.

SEC. 102. Moneys appropriated pursuant to this Act shall also be available, in addition to meeting expenses for research and investigations conducted under authority of this Act, for printing and disseminating the results of such research, retirement of employees subject to the applicable provisions of the Act approved March 4, 1940 (54 Stat. 39), administrative planning and direction, and for the purchase and rental of land and the construction, acquisition, alteration, or repair of buildings necessary for conducting research. The State water resources research agencies are authorized to plan and conduct any research authorized under this Act in cooperation with each other and such other agencies and individuals as may contribute to the solution of the water problems involved, and moneys appropriated pursuant to this Act shall be available for paying the necessary expenses of planning, coordinating, and conducting such cooperative research. Two or more States may cooperate in the designation of a single interstate or regional research institute or center.

SEC. 103. Bulletins, reports, periodicals, reprints of articles, and other publications necessary for the dissemination of results of the researches and experiments, including lists of publications available for distribution by the institutions, shall be transmitted in the mails of the United States under penalty indicia: *Provided, however*, That each publication shall bear such indicia as are prescribed by the Postmaster General and shall be mailed under such regulations as the Postmaster General may from time to time prescribe. Such publications may be mailed from the principal place of business of the institute or center, or from an established subunit of such agency.

SEC. 104. The Secretary of the Interior is hereby charged with the responsibility for the proper administration of this Act, and, after full consultation with other Federal agencies, is authorized and directed to prescribe such rules and regulations as may be necessary to carry out its provisions, including requirement of a showing that agencies designated to receive funds have, or may

reasonably be expected to have, the capability of doing effective work. It shall be the duty of the Secretary to furnish such advice and assistance as will best promote the purposes of this Act, including participation in coordination of research initiated under this Act by the State water resources research agencies, from time to time, to indicate such lines of inquiry as to him seem most important, and to encourage and assist in the establishment and maintenance of cooperation by and between the several State water resources research agencies and between the State agencies and the United States Department of the Interior and other Federal establishments.

On or before the 1st day of July in each year after the passage of this Act, the Secretary of the Interior shall ascertain as to each State whether it is entitled to receive its share of the annual appropriations for water resources research under section 100(a) of this Act and the amount which thereupon each is entitled, respectively, to receive.

The Secretary of the Interior shall make an annual report to the Congress of the receipts and expenditures and work of the water resources research agencies in all States under the provisions of this Act and also whether any portion of the appropriation available for allotment to any State has been withheld and if so the reasons therefor.

SEC. 105. Nothing in this Act shall be construed to impair or modify the legal relation existing between any of the colleges or universities under whose direction State water resources research institutes or centers are established and the government of the States in which they are respectively located: *Provided*, That in any State which designates more than one such college or university to have a water resources research center the appropriations made pursuant to section 100 (a) of this Act for such State shall be divided between such institutions as the legislature of such State shall direct: *Provided further*, That in any instance where two or more States designate a single interstate or regional institute or center, the funds of each of the States under section 100(a) may, upon the direction of the States, be paid to the designated agency.

TITLE II—ADDITIONAL WATER RESOURCES RESEARCH PROGRAMS

SEC. 200. There is authorized to be appropriated to the Secretary of the Interior \$5,000,000 in fiscal year 1964, increasing \$1,000,000, annually for five years, and continuing at \$10,000,000 annually thereafter from which he may make grants, contracts, matching, or other arrangements with educational institutions, private foundations, or other institutions; with private firms and individuals; and with local, State, or Federal government agencies, to undertake research into any aspects of water problems related to the mission of the Department of the Interior, which may be deemed desirable and are not otherwise being studied.

TITLE III—MISCELLANEOUS PROVISIONS

SEC. 300. The Secretary of the Interior shall arrange for the regular advice and cooperation of all agencies of the Federal Government concerned with water problems, of State and local governments and of private institutions and individuals, to assure that the programs authorized in this Act will supplement and not duplicate established water research programs, to stimulate research in otherwise neglected areas, and to contribute to a comprehensive, nationwide program of water and related resources research. He shall make generally available information and reports on projects completed, in progress, or planned under the provisions of this Act, in addition to any direct dissemination

of information by the research agencies themselves. Each Federal agency doing water resources research or investigations shall advise the Secretary of the Interior at least once annually of work underway or scheduled by it. The Secretary of the Interior shall classify and maintain for general use a catalog of water resources research and investigation projects in progress or scheduled by Federal agencies, and by such non-Federal agencies of government, colleges, universities, private institutions, firms and individuals as may make voluntarily available information to him: *Provided*, That upon the establishment of a central or general system of cataloging current and projected scientific research in all fields encompassing the cataloging function herein authorized, the President may transfer this function as he determines to be desirable.

SEC. 301. Nothing in the foregoing section nor in this Act is intended nor shall be construed as giving its Secretary or the Department of the Interior any authority or surveillance over water resources research conducted by any other agency of the Federal Government, nor shall it be construed as repealing, superseding, or diminishing existing authorities or responsibilities of any agency of the Federal Government to plan and conduct, contract for, or assist in research in its areas of responsibility and concern with water resources.

SEC. 302. The Secretary of the Interior is authorized to establish in the Department of the Interior a Water Resources Service for the purpose of administering programs authorized in this Act.

SEC. 303. Not to exceed 4 per centum of any funds appropriated pursuant to the provisions of this Act may be used for the purpose of administration. The Secretary of the Interior is authorized to employ a director of the Water Resources Service at civil service grade 18 and, if necessary to obtain personnel competent to administer a program involving scientific knowledge and highly trained staffs, he may employ not to exceed five employees above civil service grade 15 in addition to the number otherwise authorized by law.

SEC. 304. Contracts or other arrangements for water resources research work authorized under this Act may be undertaken without regard to the provisions of section 3648 of the Revised Statutes (31 U.S.C. 529) when in the judgment of the Secretary of the Interior such payments are necessary to facilitate such research.

SEC. 305. Within not more than a year following the fifth year of operation of this Act, the Secretary of the Interior shall prepare and submit to the President for transmittal to the Senate and the House of Representatives a comprehensive report on progress and accomplishments under the Act, together with his recommendations on revisions of the Act, and with the independent recommendations of the governing authorities of the State colleges and universities on desirable revisions. This section is not intended to preclude any interim recommendations deemed desirable.

SEC. 306. This Act may be known as the Water Resources Research Act.

The excerpts presented by Mr. ANDERSON are as follows:

EXCERPTS FROM THE STATEMENT OF SENATOR CLINTON P. ANDERSON UPON INTRODUCTION OF S. 3579 ON JULY 27, 1962

The dollar authorizations for water resources research included in the bill are, if anything, too modest.

At the present time Federal appropriations for water and related resource development are in the order of \$1¼ billion. Total national expenditures are estimated to be run-

ning \$10 billion annually and they will have to double that amount, averaging \$20 billion a year, during the next 20 years, if the Nation is to keep pace with water requirements.

The \$20 million total maximum Federal support for water research proposed in this bill is less than 2 percent of the rate of Federal expenditures for water development, only two-tenths of 1 percent of the national rate of expenditure on water development and amounts to only 1 mill—one-tenth of 1 percent—of each dollar of average annual investment in water resources needed in the two decades just ahead.

Since the bill would establish water resources research institutes in every State to service nationwide need for research and information the comparison of cost with the total national investment in water facilities is the most appropriate.

The Interior and Insular Affairs Committee has attempted to keep in touch with the progress of the surveys being made at the President's direction and to be prepared, as soon as the reports are ready, to hold hearings and expedite needed legislation.

The committee has itself obtained reports from the executive departments and agencies most involved on their water resources research activities.

In addition, in order to have a broad national picture of the water research situation, it has obtained information from more than a hundred colleges and universities, foundations, companies, and individuals, and their suggestions and recommendations as to a national water resources research policy and program.

A few points have been emphasized repeatedly in the replies which the committee has received to its inquiries.

One of them is the need for more fundamental scientific research in the water field—the basic research to provide a better basis for natural resources planning of which the President spoke in his message.

Numerous responses to the committee's request for views and recommendations urge greater emphasis on such fundamental studies.

Another point is the large number of disciplines, or fields of specialized knowledge, involved in solving our water problems. They involve not just hydrologists but virtually every field of the physical sciences from the astronomy to geology, the social sciences, engineers, economists, and water lawyers.

In June 1961 an important symposium was held on research needs in civil engineering fields related to water resources under the joint sponsorship of the American Society of Civil Engineers, the Bureau of Reclamation, and Colorado State University. Findings of the panel on the needs for an expanded research program on conservation and utilization of water at that conference, under the chairmanship of Mr. Harvey O. Banks, formerly director of the Division of Water Resources of the State of California and now vice president of the engineering firm of Leeds, Hill and Jewett, which have been submitted to our committee, emphasize this point in telling engineers of the greatly broadened field with which they must deal in handling engineering aspects of water projects. The report said, in part:

"In past years civil engineering research has generally kept pace with national growth within the limits of a slowly growing body of basic knowledge. However, with the recent upsurge in scientific knowledge and burgeoning trends in population growth and industrialization, there are now concentrations of water demands and waste-producing activities which, coupled with new types of demand on water resources, tremendously increase the complexity of civil engineering

tasks. It is clear that this requires tremendous increases in engineering knowledge in order to do the necessary job most efficiently and most economically, and to develop methods for taking care of needs at the time when total water requirements approach the limit of the available supplies.

"The scope of the research effort required includes not only basic research, that is, inquiry into basic phenomena such as soil-water-plant relationships and atmospheric physics, but also the development of new or improved designs, techniques, methodology, and procedures, through applied research and field experimentation. More research attention needs to be given to measurement and evaluation of the effects and results of operating projects in order to have the benefit of such information in the planning and management of future projects. The additional information now needed by the civil engineer in his task of water development involves not only engineering research but also the physical sciences and the social sciences. Thus, an interdisciplinary approach to research is mandatory. The following are but a few of the many disciplines involved: mathematics, physics, chemistry, geology, meteorology, statistics, bacteriology, biology, geography, soil science, agriculture, forest management, law, economics, public administration, political science, medicine, sociology.

"To the extent that most governmental agencies find it difficult to undertake interdisciplinary research into such basic subjects as objectives of planning and allocation of resources, because of the limitations in their basic legislative authorities, it will be necessary for general subjects to be attacked by legislative committees and by university research people. Research scholars will have to be drawn from the social sciences and public administration fields, but the panel believes that the concepts of the research projects should be evolved by the engineering faculties. In regard to university research, the panel wishes to emphasize that the needed research effort goes beyond the so-called basic research and that problems of applied research are equally worthy of attention. Governmental agencies should initiate or expand, as the case may be, programs for sponsorship and support of research activities at the universities."

Still another point of emphasis in the committee's responses is the shortage, not only of hydrologists, but of scientists and experts in the many related fields who are familiar with water problems.

Dr. Joseph L. Fisher of Resources for the Future wrote, in response to the committee's inquiry:

"We believe there is a genuine shortage of well-qualified personnel for water resources planning, research and administration. In view of the very large investment the Federal Government is called upon to make in water development, it may wish to consider possible arrangements for assisting universities in strengthening programs of study for graduate-level students in various aspects of water development. Particular emphasis should be placed on development of people who can conduct research in the water field and who can participate effectively in planning complex systems of water resources management."

John C. Geyer, chairman of the department of sanitary engineering and water resources at Johns Hopkins University, responding to the committee for his school, wrote:

"Scientifically trained people of exceptional ability rarely go into the water field. If an attempt were made to establish broadly based fresh water science research institutes, difficulty would be encountered in staffing them with competent people. Universities need support in developing water science training programs to provide staff for such

institutes. Students should be attracted from all the sciences and professions and afforded an opportunity to pursue any of a variety of educational and research projects related to water."

Still another point of repeated emphasis, reflected in the two quotations just given, was the advantage—if not the absolute necessity—of going to the colleges and universities of the Nation for experts in the many fields involved and tying research and education together.

Prof. Carl E. Kindsvater, of the University of Georgia, wrote us, for example:

"I would emphasize that research and education cannot be considered separately, for just as education is essential to the performance of research, so is research essential to the education process. I believe, therefore, that a considerable part of the Federal Government's investment in water-related research should be earmarked for the support and intensification of university research and graduate study programs."

There was an additional point, not directly commented upon in the responses to the committee, but apparent from the nature of water resources activities reported to us by many of the colleges and universities.

That is the need for centers throughout the country where State officials concerned with State, regional and local water problems, local officials involved in municipal water supply, and waste disposal industries, farmers who are dependent on water to produce their crops, recreation planners and administrators, soil conservationists and the many, many others who have special concern with water, can turn both for research assistance and information. It is well expressed in the statement that, in addition to research, we must have a system of communication to water users through which new information and the results of research can be disseminated to water users. Users include not just a comparative few governmental officials and private industries, but all the farmers and householders and citizens in the Nation.

Reports from many of the colleges and universities show that their faculty members are already consulting with governors, State planning agencies, fish and wildlife officials, mayors and water commissioners, industries, soil conservationists and others, on State and local water problems of a widely varying nature. The problems are not confined to a few familiar fields such as control of water erosion of the land, water quality and waste disposal, but include water resource planning in the local areas, revision of water law to meet modern needs, methods of evaluating economic benefits—the whole gamut of potential problems in the field as they relate to local, State and regional situations.

It is impossible to study the materials gathered together by the Interior Committee without realizing that we must have more than a Federal water research program. We must have a nationwide program, with centers out in the States where research on local problems will be given attention along with broader and more basic research, and where local applications of knowledge developed, anywhere in the Nation, or the world, can be worked out.

The points I have outlined constitute a diagnosis of some major needs in the water resources field. The prescription to meet these needs is not difficult to write. We already have a highly successful national research system, with 75 years of experience and demonstrated worth behind it, which meets these very needs—our agricultural research establishment.

That establishment, in addition to extensive direct Federal research, includes a system of agricultural experiment stations at the land-grant colleges and State universities, established under the Hatch Act approved March 2, 1887.

These experiment stations make available the finest scientists on the college and university faculties for study of both the basic scientific concerns and the practical problems of agriculture. They combine education and research. They produce both research reports and the highly trained personnel necessary to carry on the work in the future. They serve a State and local clientele, meeting their needs for research and for information on local problems.

The bill I have introduced today to establish water resources research institutes at the land-grant colleges and State universities, and to encourage water research at other colleges and universities, foundations, private research agencies and individuals is an effort to copy and expand the agricultural experiment station system and the pattern on which it was built.

Much of the language of the bill is from the Hatch Act of 1887, or a revision and codification of that act and laws supplementing it which was passed by Congress and approved August 11, 1955.

The pattern includes the provision of a basic appropriation to help establish a Water Resources Research Institute in each land-grant school, and to supplement this modest basic grant with matching funds for specific research projects. This is copied directly from the successful agricultural pattern. The administrative provisions—the house-keeping arrangements on which a highly satisfactory Federal-State relationship have been built by the agricultural groups over three-quarters of a century, are copied almost exactly from the Hatch Act.

The proposed Water Resources Service parallels the Department of Agriculture's Co-operative State Experiment Station Service.

The bill makes it clear that there is to be no interference with water research work done by Federal departments and agencies, just as there is no interference in agriculture with the work of the Federal Agricultural Research Service or the Economic Research Service. Federal agencies should and must continue to conduct direct research on problems within their field of responsibility, as the Department of Agriculture does at Beltsville, at numerous regional laboratories, through special research contracts, and with its own nationally oriented staff.

There is little need to discuss the success of the agricultural research system which it is proposed to copy here in Congress where we are confronted with the problem of managing agricultural surpluses. We know how well the agricultural research system has worked. Its success has been phenomenal, and although we regard as a great vexation the farm surpluses which are attributable to the technological revolution in agriculture which our research brought on, there is not one of us who would trade our food surpluses for Asia's shortages. The choice between abundance and scarcity is not a difficult one.

The proposed water resources research bill contains, in title II, a separate fund which can be used to stimulate water research in nonland-grant colleges and universities, foundations, private businesses, and by individuals. This is an expansion or extension of the agricultural research pattern.

It would not be either equitable or wise, in my opinion, to limit Federal support of water research to the land-grant schools, although they are historically related to the Federal Government. Some of our most important research on water resources has been initiated in other scientific institutions. These other institutions have a considerable proportion of the scarce personnel whose attention to water problems is so greatly needed and we need to enlist qualified personnel in water research work wherever we can find it. Many of us feel that there should be greatly increased and broadened

support to higher education generally. A measure of such Federal support can be provided in this instance in equity, and in the national interest.

My purpose in introducing this water resources research bill near the close of a session, and the close of a Congress, is, as previously stated, to permit discussion, improvement and refinement of the bill in the period between Congresses.

A rough draft of the measure has already been submitted to a number of college and university officials soliciting their suggestions. Their acknowledgments have, without exception, endorsed the concept and the purposes of the measure and assured cooperation in developing a revised and refined measure which I hope many Senators will join me in introducing next year.

Dr. John A. Hannah, president of Michigan State University, wrote on July 20:

"We see considerable merit in your proposal and endorse the general program which it seeks to realize. Through its proposed implementation, the draft bill takes cognizance of the fact that the use of water constitutes one of the most complex and pressing problems confronting almost every State in the country. The bill further recognizes that because of the complexities involved an interdisciplinary approach is mandatory, that both basic and applied research are required and that there is need to collect and disseminate important information pertaining to this whole problem. At the same time, the draft bill does not exclude the possibility of supplemental funds not covered by the bill.

"As indicated, we endorse the concept and general idea expressed in the draft bill."

President W. E. Morgan of Colorado State University, who is chairman of the Water Resources Committee of the American Association of State Universities and Land Grant Colleges, earlier this month, at my request, sent copies of the first draft of the bill to the 12 college and university presidents who constitute his committee, requesting their comment.

A few days ago, President Morgan wrote me:

"Replies have not yet come from all members, but it is clear that the committee strongly favors my recommending to you that you proceed without delay to introduce the bill in substantially the text embodied in the draft at hand. Our committee will in due course have some suggestions about the text."

I am, of course, pleased that the president of my own New Mexico State University, Dr. Roger Corbett, has written me that—

"This is a splendid bill and meets a most pressing public need."

He adds:

"The benefits per dollar of research investment will probably far exceed those in many other areas where the Federal Government is now sponsoring research. These research institutes will help in coordinating and encouraging the kind of comprehensive research in the water resources field which has been urgently needed for many years."

Advancing our knowledge is not a partisan matter, nor solely a private matter, nor solely a governmental concern, particularly in a critical area such as essential water supply.

In 1960, President Eisenhower's Science Advisory Committee transmitted to President Eisenhower the findings and recommendations of its Panel on Basic Research and Graduate Education. The distinguished panel was chaired by Dr. Glenn T. Seaborg, then chancellor of the University of California at Berkeley and now Chairman of the Atomic Energy Commission. The report has been published under the title of "Scientific Progress, the Universities, and the Federal Government." The Panel's report said:

"Both the security and the general welfare of the American people urgently require continued, rapid, and sustained growth in the strength of American science. We believe that most Americans are in favor of more and better science. In a general way Americans recognize that scientific understanding is at once highly valuable in its own right and quite indispensable for the sustained progress of a modern industrialized society. Most of all we have learned to recognize that the defense and advancement of freedom require excellence in science and in technology * * * American science in the next generation must quite literally, double and redouble in size and strength. This means more scientists, better trained with finer facilities. Many forces contribute to this urgent need for growth. Our population is rapidly increasing, so that there must be more and more young people to be taught, and we have nothing like the number of qualified teachers we need even now. Science itself is expanding so fast that our efforts would have to be much increased, if we were only to keep up with its international momentum. The training of scientists takes longer than it used to, and the facilities needed in a modern laboratory are usually much more complex and expensive than those that were needed only a few years ago. Science and technology today have steadily growing mutual impact, so that the practical man has need of the closest and most immediate access to new results in basic science. Thus both science and scientists must be more and more widely diffused throughout our society. We need more men doing more things, with more support, in more places. And each of these requirements is better measured by multiplication than by addition. It is the simple truth that if this country is to safeguard its freedom and harvest the great opportunities of the next generation of science, the level of its scientific investment must be multiplied and multiplied again.

"Yet the right word is 'investment.' What this country spends on excellence in the sciences is not money gone with the wind. It is money that brings us handsome returns, and of many kinds. In immediate economic terms the proposition is clear enough: What we have done in science has brought our society riches many times greater than what science costs us, and this will be true as far in the future as we can see. In economic terms, indeed, scientific investment has quite extraordinary power. Ordinary capital investments put savings to work on laborsaving machinery that is already known and understood; the increased wealth produced is what separates the developed modern society from helpless poverty. But scientific and technological investments are still more powerful tools, since they invest in the discovery of what we do not yet understand. We are only just at the beginning of the use of scientific investment in this large sense, and returns it can bring in are literally incalculable. Simply in terms of economic self-interest our proper course is to increase our investment in science just as fast as we can, to a limit not yet in sight."

As President Kennedy has pointed out, water problems are worldwide. This Nation's findings in the field of water resources will not only serve the people of the United States but peoples around the world and thereby—as the Seaborg panel has pointed out—make a great contribution to the defense and advancement of freedom.

ESTABLISHMENT OF RULES OF INTERPRETATION GOVERNING QUESTIONS OF EFFECT OF ACTS OF CONGRESS ON STATE LAWS

Mr. McCLELLAN. Mr. President, on behalf of myself and Senators EASTLAND,

THURMOND, MUNDT, SPARKMAN, HOLLAND, CURTIS, STENNIS, BYRD of Virginia, ROBERTSON, HICKENLOOPER, HILL, RUSSELL, FULBRIGHT, ELLENDER, BENNETT, YOUNG of North Dakota, WILLIAMS of Delaware, TALMADGE, GOLDWATER, JORDAN of North Carolina, SMATHERS, JOHNSTON, TOWER, and LONG of Louisiana, I introduce for appropriate reference a bill to establish rules of interpretation governing questions of the effect of acts of Congress on State laws.

This bill is identical with the amendment in the nature of a substitute, which I—joined by many other Senators—offered to Senate bill 654, the so-called Bridges bill, on August 20, 1958, in the 2d session of the 85th Congress. It will be recalled that a motion to recommit that bill was carried by a record vote of 41 to 40.

The measure I am introducing is also the same as S. 3 of the 86th and 87th Congresses. It is likewise identical with H.R. 3, which has passed the House of Representatives twice—in the 85th and 86th Congresses. This same bill was favorably reported by the House Committee on the Judiciary in the 87th Congress.

The measure is commonly referred to as the antipreemption bill. I shall not discuss it in detail as its purpose and provisions are well known to most Senators. I point out, however, that it is designed to correct the situation that exists under present rulings of the U.S. Supreme Court, to the effect that when Congress has enacted legislation on any subject, the States are deprived of the power to enact or enforce similar State laws, even though they may not be in conflict with the Federal statute.

To remedy this situation the bill I am introducing provides in section 1 that no act of Congress shall be construed as indicating an intent on the part of Congress to occupy the field in which such act operates to the exclusion of all State laws on the same subject matter, unless such act contains an expressed provision to that effect. It further provides that no provision of an act of Congress shall be construed as invalidating a provision of State law which would be valid in the absence of such act, unless there is direct and positive conflict between such provisions so that the two cannot be reconciled or consistently stand together.

Section 2 of the bill relates to a particular field of law, subversion and sedition. It provides that the enactment of any Federal law prescribing a criminal penalty for subversion or sedition against the United States or any State shall not prevent the enforcement of State criminal statutes on the same subject.

Mr. President, in recent years we have seen a disturbing extension of the Federal preemption doctrine to many areas of concurrent Federal-State jurisdiction. As a result many worthwhile and constructive State laws have been nullified and voided by decisions of the Supreme Court of the United States. I have long been convinced of the very real and compelling need for the establishment of clear and concise guide rules in this area of the law, and it is to serve this need—and for this purpose—that I am introducing this measure today.

I ask unanimous consent that the bill may lie on the desk until the close of business on next Monday, January 21, in order that other Senators who may desire to do so may join as sponsors.

The VICE PRESIDENT. The bill will be received and appropriately referred; and, without objection, the bill will lie on the desk, as requested by the Senator from Arkansas.

The bill (S. 3) to establish rules of interpretation governing questions of the effect of acts of Congress on State laws, introduced by Mr. McCLELLAN (for himself and other Senators), was received, read twice by its title, and referred to the Committee on the Judiciary.

WILDERNESS ACT

Mr. ANDERSON. Mr. President, I send to the desk for appropriate reference, a bill to establish a National Wilderness Preservation System for the permanent good of all the people and for other purposes.

The bill is being introduced for myself, Senator KUCHEL, of California, Senator HUMPHREY, of Minnesota, and Senators JACKSON, CHURCH, LAUSCHE, DOUGLAS, WILLIAMS, of New Jersey, RANDOLPH, CLARK, PROXMIER, NEUBERGER, METCALF, and McGOVERN. I request that it be left on the desk for 3 days so any others who care to do so may join as cosponsors.

The measure, as introduced, is identical to the wilderness bill passed by this body on September 6, 1961, by a vote of 78 yeas to 8 nays with the exception of a change of one word, which is of no particular significance. It is on page 18, line 15 of the bill printed as passed. A reference to national forest "superintendents" has been changed to national forest "supervisors." The measure will now conform to Forest Service terminology.

Mr. President, late in the final session of the 84th Congress, my predecessor, as chairman of the Senate Interior and Insular Affairs Committee, James E. Murray, introduced the first wilderness proposal in Congress. It was a study bill, introduced for the purpose of giving some original form to the idea and to stimulate discussion of it with executive agencies, proponents and opponents of the proposal.

The original draft was greatly revised after discussions with the executive agencies, and a new bill was introduced in the 85th Congress by Senator HUMPHREY and a number of cosponsors. Extensive hearings were held on it by the full committee in June 1957. As a result of these hearings, the bill was again redrafted to eliminate objectionable provisions and to adopt constructive proposals. It was reintroduced in the second session of the 85th Congress, early in 1958, as S. 4028. Washington hearings were held on July 23, 1958. Field hearings were held in Bend, Oreg., San Francisco, Salt Lake City, and Albuquerque, N. Mex., in November 1958.

A revised measure was again introduced by Senator HUMPHREY and a number of cosponsors during the first session of the 86th Congress, which carried the

number, S. 1123. Field hearings were held on it in Seattle, Wash., on March 30 and 31 and Phoenix, Ariz., on April 2, 1959. During 1960, the Interior and Insular Affairs Committee held a number of executive sessions on the bill in which the executive agencies, which were all then in support of the proposal, offered their final suggestions.

The committee did not finally bring the bill to a vote during the 86th Congress. Upon assuming chairmanship of the committee, I had the measure redrafted and introduced it together with a number of cosponsors on January 5, 1961.

Our full committee again held Washington hearings on February 27 and 28. After thorough consideration of the measure in executive sessions, the committee ordered the bill reported July 13, 1961. It was my privilege to report it to the Senate with committee amendments on July 27, 1961.

The measure was debated on the floor of the Senate for 2 days, September 5 and 6, 1961, and passed by the Senate by a vote of 78 yeas to only 8 nays, virtually 10 to 1. I was particularly gratified by this vote for it was taken during my absence in New Mexico, keeping an appointment with the surgeon. The presentation of the bill had been ably handled by the senior Senator from Idaho [Mr. CHURCH] with the assistance of the junior Senator from Montana [Mr. METCALF].

Mr. President, I have reviewed the extremely lengthy and thorough consideration of this bill and the final overwhelming support of it by the Senate to explain my reason for reintroducing it as it was passed by the Senate after 6 years of careful consideration and refinement. It is my personal belief that the bill, as passed by the Senate in 1961, was a splendid document. The overwhelming vote shows that this was the opinion of the Senate. I believe this body will want to pass it again and return it to the House sufficiently early to give that body abundant time to consider it during the present Congress.

The Senate and Interior and Insular Affairs Committee will hold further hearings on the measure at a very early date to hear any suggestions or pertinent facts which may have arisen since Senate passage in 1961. In view of the care with which the measure has previously been considered and the 2-day debate to which the measure was subjected on the Senate floor, I do not contemplate, however, that the committee will require an extensive period to complete its work and report a bill to the floor.

The VICE PRESIDENT. The bill will be received and appropriately referred; and, without objection, the bill will lie on the desk, as requested by the Senator from New Mexico.

The bill (S. 4) to establish a National Wilderness Preservation System for the permanent good of the whole people, and for other purposes, introduced by Mr. ANDERSON (for himself and other Senators), was received, read twice by its title, and referred to the Committee on Interior and Insular Affairs.

THE COLD WAR VETERANS READJUSTMENT ASSISTANCE ACT

Mr. YARBOROUGH. Mr. President, on behalf of myself and Senators HUMPHREY, HILL, SPARKMAN, MORSE, NEUBERGER, KEFAUVER, SMITH, BYRD of West Virginia, GRUENING, HARTKE, EASTLAND, LONG of Missouri, BURDICK, BIBLE, RANDOLPH, WILLIAMS of New Jersey, DOUGLAS, PELL, BARTLETT, INOUYE, McGEE, CLARK, DODD, and McGOVERN, I introduce, for appropriate reference, a bill entitled "The Cold War Veterans Readjustment Act."

The VICE PRESIDENT. The bill will be received and appropriately referred.

The bill (S. 5) to provide readjustment assistance to veterans who serve in the Armed Forces during the induction period, introduced by Mr. YARBOROUGH, was received, read twice by its title, and referred to the Committee on Labor and Public Welfare.

Mr. YARBOROUGH. Mr. President, I ask unanimous consent that the bill may lie at the desk until Monday, January 21, 1963, for additional cosponsors.

The PRESIDING OFFICER. Without objection, it is so ordered.

Mr. YARBOROUGH. Mr. President, the provisions of the bill are identical with those of a similar bill introduced last year, with the exception of the vocational rehabilitation for service-connected disabled veterans provisions of that bill, which became public law last session.

A cold war GI bill I introduced in 1959 passed the Senate in the 86th Congress by a vote of 57 to 31. The cold war bill of the 87th Congress was sponsored by me with 36 other Senators and was favorably reported by the Committee on Labor and Public Welfare. The proposed legislation has always enjoyed broad public support, and its popularity among the people is greater today than ever before. The requests for its passage are vast in number.

Each year a large number of American youth embark upon 2, 3 or more years of service in our Military Establishment. They do so, Mr. President, and the country needs them to do so, because foreign powers continue to threaten the security of this Nation and of the free world.

We know that this threat to the free world is crystal clear. We know this because of the Cuban problem, which, though in a state of "containment" at the present time, will require armed vigilance by us until the last vestige of danger to this Nation has been removed from that island.

The Cuban danger—though closest to our shores—is not the only danger we face. In Vietnam, West Berlin, and other hot spots around the world, American youth will be required to serve their Nation for long into the future. The bill I have introduced provides an opportunity to demonstrate that we, as a Nation, do recognize the extreme, unique personal sacrifices exacted from our cold war veterans by their military service.

88TH CONGRESS
1ST SESSION

H. R. 2683

IN THE HOUSE OF REPRESENTATIVES

JANUARY 24, 1963

Mr. MORRIS introduced the following bill; which was referred to the Committee on Interior and Insular Affairs

A BILL

To establish water resources research centers at land-grant colleges and States universities, to stimulate water research at other colleges, universities and centers of competence, and to promote a more adequate national program of water research.

1 *Be it enacted by the Senate and House of Representa-*
2 *tives of the United States of America in Congress assembled,*
3 That it is the policy and purpose of the Congress to assure
4 the Nation at all times an abundance of water, both as to
5 quantities and quality, necessary to meet the requirements
6 of its expanding population, and, to help achieve this objec-

1 tive, to stimulate, sponsor, and provide for the conduct of
2 research, investigations, and experiments in the field of water
3 and related resources as they affect water, supplementing
4 present programs, and to encourage the training of scientists
5 in fields related to water by assistance to colleges and univer-
6 sities in the development of water resources research
7 programs.

8 TITLE I—STATE WATER RESOURCES RESEARCH
9 INSTITUTES OR CENTERS

10 SEC. 100. (a) There is authorized to be appropriated,
11 for the fiscal year 1964 and subsequent years, for distribu-
12 tion to a college or university in each State and Puerto Rico,
13 established in accordance with an Act approved July 2,
14 1862 (12 Stat. 503), entitled "An Act donating public
15 lands to the several States and territories which may provide
16 colleges for the benefit of agriculture and the mechanic arts",
17 or such other institutions of higher education as any State
18 shall determine, a sum adequate to provide \$75,000 to each
19 State in the first year, to be increased by \$12,500 each
20 succeeding fiscal year for two years and to continue at
21 \$100,000 thereafter, for the purpose of establishing a college-
22 wide or universitywide water resources research institute,
23 center, or equivalent agency. It shall be the duty of each
24 such institute or center to plan and conduct and/or arrange
25 for a component or components of its college or university

1 to conduct competent researches, investigations, or experi-
2 ments, of either a basic or practical nature, or both, in re-
3 lation to water resources, including but not limited to aspects
4 of the hydrological cycle, supply and demand for water,
5 conservation and best use of available supplies, methods of
6 increasing such supplies, economic, legal, social, engineering,
7 recreation, biological, geographic, ecological, and other
8 aspects of water problems, as may in each case be deemed
9 advisable, having due regard to the varying conditions and
10 needs of the respective States and Puerto Rico, to water
11 research projects being conducted by agencies of the Federal
12 Government, and to those related to agriculture being con-
13 ducted by the agricultural experiment stations, and also hav-
14 ing regard to avoidance of any undue displacement of scien-
15 tists and engineers elsewhere engaged in water resources
16 research.

17 (b) There is further authorized to be appropriated to
18 the Secretary of the Interior in the fiscal year 1964 the sum
19 of \$1,000,000, increasing by \$1,000,000 each year for four
20 years to \$5,000,000 in fiscal year 1968 and thereafter, which
21 the Secretary of the Interior may use to match, on a dollar
22 for dollar basis, funds made available to State water re-
23 sources research institutes or centers by the States or other
24 non-Federal sources, to meet the necessary expenses of water
25 resources research projects which could not otherwise be

1 undertaken, including the expense of planning and coordinat-
2 ing regional water resources research projects by two or
3 more State water research agencies.

4 SEC. 101. Sums available to the States under the terms
5 of section 100 (a) of this Act shall be paid to the designated
6 institution or institutions in each State in equal quarterly
7 payments beginning on the first day of July of each fiscal
8 year upon vouchers approved by the Secretary of the
9 Interior. Each such agency authorized to receive funds
10 shall have an officer appointed by its governing authority
11 who shall receive and account for all funds paid to the State
12 under the provisions of this Act and shall make an annual
13 report to the Secretary of the Interior, on or before the first
14 day of September of each year, on work accomplished and
15 the status of projects underway together with a detailed
16 statement of the amount received under any of the provisions
17 of this Act during the preceding fiscal year, and of its dis-
18 bursement, on schedules prescribed by the Secretary of the
19 Interior. If any of the moneys received by the authorized
20 receiving officer of any State water resources research agency
21 under the provisions of this Act shall by any action or con-
22 tingency be found by the Secretary of the Interior to have
23 them improperly diminished, lost, or misapplied, it shall be
24 replaced by the State concerned and until so replaced no
25 subsequent appropriation shall be allotted or paid to such

1 States. Pending a meeting of the legislature of any State,
2 the Secretary of the Interior shall pay sums appropriated
3 pursuant to section 100 of this Act to a qualified institution
4 designated by the Governor of such State.

5 SEC. 102. Moneys appropriated pursuant to this Act
6 shall also be available, in addition to meeting expenses for
7 research and investigations conducted under authority of this
8 Act, for printing and disseminating the results of such re-
9 search, retirement of employees subject to the applicable pro-
10 visions of the Act approved March 4, 1940 (54 Stat. 39),
11 administrative planning and direction, and for the purchase
12 and rental of land and the construction, acquisition, altera-
13 tion, or repair of buildings necessary for conducting research.
14 The State water resources research agencies are authorized
15 to plan and conduct any research authorized under this Act
16 in cooperation with each other and such other agencies and
17 individuals as may contribute to the solution of the water
18 problems involved, and moneys appropriated pursuant to this
19 Act shall be available for paying the necessary expenses of
20 planning, coordinating, and conducting such cooperative re-
21 search. Two or more States may cooperate in the designa-
22 tion of a single interstate or regional research institute or
23 center.

24 SEC. 103. Bulletins, reports, periodicals, reprints of

1 articles, and other publications necessary for the dissemina-
2 tion of results of the researches and experiments, including
3 lists of publications available for distribution by the institu-
4 tions, shall be transmitted in the mails of the United States
5 under penalty indicia: *Provided, however,* That each publi-
6 cation shall bear such indicia as are prescribed by the Post-
7 master General and shall be mailed under such regulations as
8 the Postmaster General may from time to time prescribe.
9 Such publications may be mailed from the principal place
10 of business of the institute or center, or from an established
11 subunit of such agency.

12 SEC. 104. The Secretary of the Interior is hereby
13 charged with the responsibility for the proper administra-
14 tion of this Act, and, after full consultation with other Fed-
15 eral agencies, is authorized and directed to prescribe such
16 rules and regulations as may be necessary to carry out its
17 provisions, including requirement of a showing that agencies
18 designated to receive funds have, or may reasonably be
19 expected to have, the capability of doing effective work. It
20 shall be the duty of the Secretary to furnish such advice and
21 assistance as will best promote the purposes of this Act,
22 including participation in coordination of research initiated
23 under this Act by the State water resources research agen-
24 cies, from time to time, to indicate such lines of inquiry as
25 to him seem most important, and to encourage and assist

1 in the establishment and maintenance of cooperation by and
2 between the several State water resources research agencies
3 and between the State agencies and the United States
4 Department of the Interior and other Federal establishments.

5 On or before the 1st day of July in each year after the
6 passage of this Act, the Secretary of the Interior shall ascer-
7 tain as to each State whether it is entitled to receive its share
8 of the annual appropriations for water resources research
9 under section 100 (a) of this Act and the amount which
10 thereupon each is entitled, respectively, to receive.

11 The Secretary of the Interior shall make an annual
12 report to the Congress of the receipts and expenditures and
13 work of the water resources research agencies in all States
14 under the provisions of this Act and also whether any portion
15 of the appropriation available for allotment to any State has
16 been withheld and if so the reasons therefor.

17 SEC. 105. Nothing in this Act shall be construed to im-
18 pair or modify the legal relation existing between any of
19 the colleges or universities under whose direction State water
20 resources research institutes or centers are established and
21 the government of the States in which they are respectively
22 located: *Provided*, That in any State which designates more
23 than one such college or university to have a water resources
24 research center the appropriations made pursuant to section
25 100 (a) of this Act for such State shall be divided between

1 such institutions as the legislature of such State shall direct:
2 *Provided further*, That in any instance where two or more
3 States designate a single interstate or regional institute or
4 center, the funds of each of the States under section 100 (a)
5 may, upon the direction of the States, be paid to the desig-
6 nated agency.

7 TITLE II—ADDITIONAL WATER RESOURCES
8 RESEARCH PROGRAMS

9 SEC. 200. There is authorized to be appropriated to the
10 Secretary of the Interior \$5,000,000 in fiscal year 1964,
11 increasing \$1,000,000, annually for five years, and continu-
12 ing at \$10,000,000 annually thereafter from which he may
13 make grants, contracts, matching, or other arrangements
14 with educational institutions, private foundations, or other
15 institutions; with private firms and individuals; and with
16 local, State, or Federal Government agencies, to undertake
17 research into any aspects of water problems related to the
18 mission of the Department of the Interior, which may be
19 deemed desirable and are not otherwise being studied.

20 TITLE III—MISCELLANEOUS PROVISIONS

21 SEC. 300. The Secretary of the Interior shall arrange
22 for the regular advice and cooperation of all agencies of the
23 Federal Government concerned with water problems, of State
24 and local governments and of private institutions and
25 individuals, to assure that the programs authorized in this

1 Act will supplement and not duplicate established water
2 research programs, to stimulate research in otherwise neg-
3 lected areas, and to contribute to a comprehensive, nation-
4 wide program of water and related resources research. He
5 shall make generally available information and reports on
6 projects completed, in progress, or planned under the
7 provisions of this Act, in addition to any direct dissemination
8 of information by the research agencies themselves. Each
9 Federal agency doing water resources research or inves-
10 tigation shall advise the Secretary of the Interior at least
11 once annually of work underway or scheduled by it. The
12 Secretary of the Interior shall classify and maintain for
13 general use a catalog of water resources research and in-
14 vestigation projects in progress or scheduled by Federal
15 agencies, and by such non-Federal agencies of government,
16 colleges, universities, private institutions, firms and in-
17 dividuals as may make voluntarily available information to
18 him: *Provided*, That upon the establishment of a central
19 or general system of cataloging current and projected scien-
20 tific research in all fields encompassing the cataloging func-
21 tion herein authorized, the President may transfer this
22 function as he determines to be desirable.

23 SEC. 301. Nothing in the foregoing section nor in this
24 Act is intended nor shall be construed as giving its Secretary
25 or the Department of the Interior any authority or surveil-

1 lance over water resources research conducted by any other
2 agency of the Federal Government, nor shall it be construed
3 as repealing, superseding, or diminishing existing authorities
4 or responsibilities of any agency of the Federal Government
5 to plan and conduct, contract for, or assist in research in its
6 areas of responsibility and concern with water resources.

7 SEC. 302. The Secretary of the Interior is authorized
8 to establish in the Department of the Interior a Water
9 Resources Service for the purpose of administering programs
10 authorized in this Act.

11 SEC. 303. Not to exceed 4 per centum of any funds
12 appropriated pursuant to the provisions of this Act may be
13 used for the purpose of administration. The Secretary of
14 the Interior is authorized to employ a director of the Water
15 Resources Service at civil service grade 18 and, if necessary
16 to obtain personnel competent to administer a program in-
17 volving scientific knowledge and highly trained staffs, he
18 may employ not to exceed five employees above civil service
19 grade 15 in addition to the number otherwise authorized by
20 law.

21 SEC. 304. Contracts or other arrangements for water
22 resources research work authorized under this Act may be
23 undertaken without regard to the provisions of section 3684
24 of the Revised Statutes (31 U.S.C. 529) when in the

1 judgment of the Secretary of the Interior such payments
2 are necessary to facilitate such research.

3 SEC. 305. Within not more than a year following the
4 fifth year of operation of this Act, the Secretary of the
5 Interior shall prepare and submit to the President for
6 transmittal to the Senate and House of Representatives
7 a comprehensive report on progress and accomplishments
8 under the Act, together with his recommendations on re-
9 visions of the Act, and with the independent recommenda-
10 tions of the governing authorities of the State colleges and
11 universities on desirable revisions. This section is not in-
12 tended to preclude any interim recommendations deemed
13 desirable.

14 SEC. 306. This Act may be known as the "Water Re-
15 sources Research Act."

A BILL

To establish water resources research centers at land-grant colleges and State universities, to stimulate water research at other colleges, universities, and centers of competence, and to promote a more adequate national program of water research.

By Mr. MORRIS

JANUARY 24, 1963

Referred to the Committee on Interior and Insular
Affairs

88TH CONGRESS
1ST SESSION

H. R. 2689

IN THE HOUSE OF REPRESENTATIVES

JANUARY 24, 1963

Mr. TEAGUE of Texas introduced the following bill; which was referred to the
Committee on Interior and Insular Affairs

A BILL

To establish water resources research centers at land-grant colleges and States universities, to stimulate water research at other colleges, universities and centers of competence, and to promote a more adequate national program of water research.

- 1 *Be it enacted by the Senate and House of Representa-*
- 2 *tives of the United States of America in Congress assembled,*
- 3 That it is the policy and purpose of the Congress to assure
- 4 the Nation at all times an abundance of water, both as to
- 5 quantities and quality, necessary to meet the requirements
- 6 of its expanding population, and, to help achieve this objec-

1 tive, to stimulate, sponsor, and provide for the conduct of
2 research, investigations, and experiments in the field of water
3 and related resources as they affect water, supplementing
4 present programs, and to encourage the training of scientists
5 in fields related to water by assistance to colleges and univer-
6 sities in the development of water resources research
7 programs.

8 TITLE I—STATE WATER RESOURCES RESEARCH
9 INSTITUTES OR CENTERS

10 SEC. 100. (a) There is authorized to be appropriated,
11 for the fiscal year 1964 and subsequent years, for distribu-
12 tion to a college or university in each State and Puerto Rico,
13 established in accordance with an Act approved July 2,
14 1862 (12 Stat. 503), entitled "An Act donating public
15 lands to the several States and territories which may provide
16 colleges for the benefit of agriculture and the mechanic arts",
17 or such other institutions of higher education as any State
18 shall determine, a sum adequate to provide \$75,000 to each
19 State in the first year, to be increased by \$12,500 each
20 succeeding fiscal year for two years and to continue at
21 \$100,000 thereafter, for the purpose of establishing a college-
22 wide or universitywide water resources research institute,
23 center, or equivalent agency. It shall be the duty of each
24 such institute or center to plan and conduct and/or arrange
25 for a component or components of its college or university

1 to conduct competent researches, investigations, or experi-
2 ments, of either a basic or practical nature, or both, in re-
3 lation to water resources, including but not limited to aspects
4 of the hydrological cycle, supply and demand for water,
5 conservation and best use of available supplies, methods of
6 increasing such supplies, economic, legal, social, engineering,
7 recreation, biological, geographic, ecological, and other
8 aspects of water problems, as may in each case be deemed
9 advisable, having due regard to the varying conditions and
10 needs of the respective States and Puerto Rico, to water
11 research projects being conducted by agencies of the Federal
12 Government, and to those related to agriculture being con-
13 ducted by the agricultural experiment stations, and also hav-
14 ing regard to avoidance of any undue displacement of scien-
15 tists and engineers elsewhere engaged in water resources
16 research.

17 (b) There is further authorized to be appropriated to
18 the Secretary of the Interior in the fiscal year 1964 the sum
19 of \$1,000,000, increasing by \$1,000,000 each year for four
20 years to \$5,000,000 in fiscal year 1968 and thereafter, which
21 the Secretary of the Interior may use to match, on a dollar
22 for dollar basis, funds made available to State water re-
23 sources research institutes or centers by the States or other
24 non-Federal sources, to meet the necessary expenses of water
25 resources research projects which could not otherwise be

1 undertaken, including the expense of planning and coordinat-
2 ing regional water resources research projects by two or
3 more State water research agencies.

4 SEC. 101. Sums available to the States under the terms
5 of section 100 (a) of this Act shall be paid to the designated
6 institution or institutions in each State in equal quarterly
7 payments beginning on the first day of July of each fiscal
8 year upon vouchers approved by the Secretary of the
9 Interior. Each such agency authorized to receive funds
10 shall have an officer appointed by its governing authority
11 who shall receive and account for all funds paid to the State
12 under the provisions of this Act and shall make an annual
13 report to the Secretary of the Interior, on or before the first
14 day of September of each year, on work accomplished and
15 the status of projects underway together with a detailed
16 statement of the amount received under any of the provisions
17 of this Act during the preceding fiscal year, and of its dis-
18 bursement, on schedules prescribed by the Secretary of the
19 Interior. If any of the moneys received by the authorized
20 receiving officer of any State water resources research agency
21 under the provisions of this Act shall by any action or con-
22 tingency be found by the Secretary of the Interior to have
23 them improperly diminished, lost, or misapplied, it shall be
24 replaced by the State concerned and until so replaced no
25 subsequent appropriation shall be allotted or paid to such

1 States. Pending a meeting of the legislature of any State,
2 the Secretary of the Interior shall pay sums appropriated
3 pursuant to section 100 of this Act to a qualified institution
4 designated by the Governor of such State.

5 SEC. 102. Moneys appropriated pursuant to this Act
6 shall also be available, in addition to meeting expenses for
7 research and investigations conducted under authority of this
8 Act, for printing and disseminating the results of such re-
9 search, retirement of employees subject to the applicable pro-
10 visions of the Act approved March 4, 1940 (54 Stat. 39),
11 administrative planning and direction, and for the purchase
12 and rental of land and the construction, acquisition, altera-
13 tion, or repair of buildings necessary for conducting research.
14 The State water resources research agencies are authorized
15 to plan and conduct any research authorized under this Act
16 in cooperation with each other and such other agencies and
17 individuals as may contribute to the solution of the water
18 problems involved, and moneys appropriated pursuant to this
19 Act shall be available for paying the necessary expenses of
20 planning, coordinating, and conducting such cooperative re-
21 search. Two or more States may cooperate in the designa-
22 tion of a single interstate or regional research institute or
23 center.

24 SEC. 103. Bulletins, reports, periodicals, reprints of

1 articles, and other publications necessary for the dissemina-
2 tion of results of the researches and experiments, including
3 lists of publications available for distribution by the institu-
4 tions, shall be transmitted in the mails of the United States
5 under penalty indicia: *Provided, however,* That each publi-
6 cation shall bear such indicia as are prescribed by the Post-
7 master General and shall be mailed under such regulations as
8 the Postmaster General may from time to time prescribe.
9 Such publications may be mailed from the principal place
10 of business of the institute or center, or from an established
11 subunit of such agency.

12 SEC. 104. The Secretary of the Interior is hereby
13 charged with the responsibility for the proper administra-
14 tion of this Act, and, after full consultation with other Fed-
15 eral agencies, is authorized and directed to prescribe such
16 rules and regulations as may be necessary to carry out its
17 provisions, including requirement of a showing that agencies
18 designated to receive funds have, or may reasonably be
19 expected to have, the capability of doing effective work. It
20 shall be the duty of the Secretary to furnish such advice and
21 assistance as will best promote the purposes of this Act,
22 including participation in coordination of research initiated
23 under this Act by the State water resources research agen-
24 cies, from time to time, to indicate such lines of inquiry as
25 to him seem most important, and to encourage and assist

1 in the establishment and maintenance of cooperation by and
2 between the several State water resources research agencies
3 and between the State agencies and the United States
4 Department of the Interior and other Federal establishments.

5 On or before the 1st day of July in each year after the
6 passage of this Act, the Secretary of the Interior shall ascer-
7 tain as to each State whether it is entitled to receive its share
8 of the annual appropriations for water resources research
9 under section 100 (a) of this Act and the amount which
10 thereupon each is entitled, respectively, to receive.

11 The Secretary of the Interior shall make an annual
12 report to the Congress of the receipts and expenditures and
13 work of the water resources research agencies in all States
14 under the provisions of this Act and also whether any portion
15 of the appropriation available for allotment to any State has
16 been withheld and if so the reasons therefor.

17 SEC. 105. Nothing in this Act shall be construed to im-
18 pair or modify the legal relation existing between any of
19 the colleges or universities under whose direction State water
20 resources research institutes or centers are established and
21 the government of the States in which they are respectively
22 located: *Provided*, That in any State which designates more
23 than one such college or university to have a water resources
24 research center the appropriations made pursuant to section
25 100 (a) of this Act for such State shall be divided between

1 such institutions as the legislature of such State shall direct:
2 *Provided further*, That in any instance where two or more
3 States designate a single interstate or regional institute or
4 center, the funds of each of the States under section 100 (a)
5 may, upon the direction of the States, be paid to the desig-
6 nated agency.

7 TITLE II—ADDITIONAL WATER RESOURCES 8 RESEARCH PROGRAMS

9 SEC. 200. There is authorized to be appropriated to the
10 Secretary of the Interior \$5,000,000 in fiscal year 1964,
11 increasing \$1,000,000, annually for five years, and continu-
12 ing at \$10,000,000 annually thereafter from which he may
13 make grants, contracts, matching, or other arrangements
14 with educational institutions, private foundations, or other
15 institutions; with private firms and individuals; and with
16 local, State, or Federal Government agencies, to undertake
17 research into any aspects of water problems related to the
18 mission of the Department of the Interior, which may be
19 deemed desirable and are not otherwise being studied.

20 TITLE III—MISCELLANEOUS PROVISIONS

21 SEC. 300. The Secretary of the Interior shall arrange
22 for the regular advice and cooperation of all agencies of the
23 Federal Government concerned with water problems, of State
24 and local governments and of private institutions and
25 individuals, to assure that the programs authorized in this

1 Act will supplement and not duplicate established water
2 research programs, to stimulate research in otherwise neg-
3 lected areas, and to contribute to a comprehensive, nation-
4 wide program of water and related resources research. He
5 shall make generally available information and reports on
6 projects completed, in progress, or planned under the
7 provisions of this Act, in addition to any direct dissemination
8 of information by the research agencies themselves. Each
9 Federal agency doing water resources research or inves-
10 tigation shall advise the Secretary of the Interior at least
11 once annually of work underway or scheduled by it. The
12 Secretary of the Interior shall classify and maintain for
13 general use a catalog of water resources research and in-
14 vestigation projects in progress or scheduled by Federal
15 agencies, and by such non-Federal agencies of government,
16 colleges, universities, private institutions, firms and in-
17 dividuals as may make voluntarily available information to
18 him: *Provided*, That upon the establishment of a central
19 or general system of cataloging current and projected scien-
20 tific research in all fields encompassing the cataloging func-
21 tion herein authorized, the President may transfer this
22 function as he determines to be desirable.

23 SEC. 301. Nothing in the foregoing section nor in this
24 Act is intended nor shall be construed as giving its Secretary
25 or the Department of the Interior any authority or surveil-

1 lance over water resources research conducted by any other
2 agency of the Federal Government, nor shall it be construed
3 as repealing, superseding, or diminishing existing authorities
4 or responsibilities of any agency of the Federal Government
5 to plan and conduct, contract for, or assist in research in its
6 areas of responsibility and concern with water resources.

7 SEC. 302. The Secretary of the Interior is authorized
8 to establish in the Department of the Interior a Water
9 Resources Service for the purpose of administering programs
10 authorized in this Act.

11 SEC. 303. Not to exceed 4 per centum of any funds
12 appropriated pursuant to the provisions of this Act may be
13 used for the purpose of administration. The Secretary of
14 the Interior is authorized to employ a director of the Water
15 Resources Service at civil service grade 18 and, if necessary
16 to obtain personnel competent to administer a program in-
17 volving scientific knowledge and highly trained staffs, he
18 may employ not to exceed five employees above civil service
19 grade 15 in addition to the number otherwise authorized by
20 law.

21 SEC. 304. Contracts or other arrangements for water
22 resources research work authorized under this Act may be
23 undertaken without regard to the provisions of section 3684
24 of the Revised Statutes (31 U.S.C. 529) when in the

1 judgment of the Secretary of the Interior such payments
2 are necessary to facilitate such research.

3 SEC. 305. Within not more than a year following the
4 fifth year of operation of this Act, the Secretary of the
5 Interior shall prepare and submit to the President for
6 transmittal to the Senate and House of Representatives
7 a comprehensive report on progress and accomplishments
8 under the Act, together with his recommendations on re-
9 visions of the Act, and with the independent recommenda-
10 tions of the governing authorities of the State colleges and
11 universities on desirable revisions. This section is not in-
12 tended to preclude any interim recommendations deemed
13 desirable.

14 SEC. 306. This Act may be known as the "Water Re-
15 sources Research Act."

A BILL

To establish water resources research centers at land-grant colleges and State universities, to stimulate water research at other colleges, universities, and centers of competence, and to promote a more adequate national program of water research.

By Mr. TEAGUE of Texas

JANUARY 24, 1963

Referred to the Committee on Interior and Insular
Affairs

Digest of CONGRESSIONAL PROCEEDINGS

OF INTEREST TO THE DEPARTMENT OF AGRICULTURE

OFFICE OF
BUDGET AND FINANCE

(For information only;
should not be quoted
or cited)

Issued February 19, 1963
For actions of February 18, 1963
88th-1st, No. 23

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HIGHLIGHTS: Sen. Hruska urged enactment of water resources research bill. Sen. McClellan introduced and discussed bill to establish Commission on Science and Technology. Sen. McClellan introduced and discussed bill to extend Reorganization Act to June 1, 1965. Sen. Muskie introduced and discussed potato marketing bill. Rep. Cooley introduced bill to provide additional Assistant Secretary. Rep. Conte criticized farm program.

SENATE

1. **WATER RESEARCH.** Sen. Hruska urged enactment of S. 2, to establish water resources research institutes or centers at land-grant colleges and universities and discussed the importance of such research on the development of water resources in Nebr. pp. 2317-20

2. **FORESTRY.** Sen. Morse urged that steps be taken by this Department and Interior to expedite the salvage of timber in Ore. blown down by a recent storm and inserted an Ore. Legislature resolution supporting such action. p. 2288

The name of Sen. Church was added as a cosponsor of S. 782, to prohibit the use of foreign lumber or other wood products in any construction or rehabilitation covered by Federal Housing Administration insured mortgages. p. 2276

3. **ELECTRIFICATION.** Sen. Mansfield inserted Vice President Johnson's speech at the annual meeting of the Rural Electric Cooperatives Assoc. reviewing and commending the rural electrification program. pp. 2299-2300

Both Houses received from Interior a proposed bill "to amend the act

authorizing the transmission and disposition by the Secretary of the Interior of electric energy generated at Falcon Dam on the Rio Grande, to authorize the Secretary of the Interior to also market power generated at Amistad Dam on the Rio Grande", to Interior and Insular Affairs Committees. pp. 2255, 2349

4. TOBACCO RESEARCH. Received a Ky. Legislature resolution urging continued Federal appropriations for tobacco research on all kinds of tobacco at the Agricultural Science Center of the Univ. of Ky. pp. 2256-7
5. FARM LABOR. Sen. Williams, N. J., inserted an address by the Most Reverend Robert E. Lucey, archbishop of San Antonio, urging improved working conditions for migratory farm workers. pp. 2311-2
6. FOREIGN AID. Sen. Miller commended the work of Self-Help, Inc., a private foundation, in providing reconditioned farm equipment to underdeveloped nations for the improvement of farming methods, and inserted several articles discussing the work of the foundation. pp. 2320-2
7. CONSERVATION. Sen. Proxmire inserted an article commending the conservation record of former Governor Gaylord Nelson of Wisc. p. 2282
8. TAXATION; EXPENDITURES. Sen. Dirksen inserted an editorial by Charles B. Shuman, president of the American Farm Bureau Federation, opposing a reduction in taxes unless Federal expenditures are reduced. p. 2292
9. MARKETING; FEDERAL TRADE. Both Houses received the annual report of the Federal Trade Commission. pp. 2255, 2349

HOUSE

10. ELECTRIFICATION. Rep. Teague, Calif., criticized REA, saying, "REA-financed cooperatives are now increasingly engaged in aggressive competition with investor-owned electric power companies," and inserted an article, "There's No Stopping the REA -- Or Is There?" pp. 2327-31
11. PERSONNEL; EMPLOYMENT. Rep. Hoeven charged that the number of employees in ASC is increasing and that the Secretary "is adding USDA employees at a faster rate than any of his predecessors." pp. 2331-2
Rep. Short stated that during the first 2 years of this administration "Federal employment increased by 135,510." pp. 2334-5
12. FOREIGN AID; AGRICULTURE. Several Reps. criticized the proposed U. N. program of agricultural aid to Cuba. pp. 2325-6, 2337, 2340-1
13. COMMITTEES. Agreed to as reported H. Res. 38, authorizing the Committee on Agriculture to conduct studies and investigations. pp. 2332-3
14. BUDGET. Rep. Michel criticized the President's budget, saying, "there is still room for serious doubt that either expenditures or the deficit can be held down to the estimates." pp. 2333-4
15. CIVIL DEFENSE. Received from the Office of Emergency Planning a copy of the Executive Stockpile Committee's report to the President on disposing of excess stockpile materials. p. 2348
Received from HEW the report of actual procurement receipts for medical stockpile of civil defense emergency supplies and equipment. p. 2348

4½ million or 22 percent of our total non-white population of 20,492,000.

These actions reflect the conviction, which I share, that discrimination in housing is a fundamental evil, underlying and supporting the evils of discrimination in public schools, parks, recreation, employment, and most of the other aspects of urban life. Breaking through the barriers of discrimination in housing will release, at the most dangerous point, the mounting racial pressures in our cities resulting from artificial restriction on local housing markets.

Upon signing the Executive order, President Kennedy cogently states his position thus:

"It is neither proper nor equitable that Americans should be denied the benefits of housing owned by the Federal Government or financed through Federal assistance on the basis of their race, color, creed, or national origin. Our national policy is equal opportunity for all and the Federal Government will continue to take such legal and proper steps as it may to achieve the realization of that goal."

The President's order calls for an end to discrimination in the rental or sale or use of Government owned and operated housing and of housing provided, after November 20, with the aid of Federal loans, advances, grants or contributions, or with the assistance of loans insured, guaranteed or otherwise secured by the credit of the Federal Government.

The amount of housing subject to the order is sizable.

For example, the Federal Housing Administration has acquired ownership, through default, of 38,000 homes and 20,000 apartments in developments all across the country that are subject to the provisions of the order. Also, since the order, FHA has insured mortgage loans on more than 12,000 new homes and 50 developments with nearly 6,000 apartments.

The Public Housing Administration has now signed annual contribution contracts for 37 projects of 2,771 units which are subject to the order. It has also asked local housing authorities to amend contracts already in the pipeline to provide assurance of nondiscrimination, and of the 194 such contracts in the South and Southwest only 13 have been canceled because of the order.

The Urban Renewal Agency has signed contracts for 20 Urban Renewal projects that will be subject to the order, and it has taken additional action to prohibit discrimination in the related nonhousing facilities to be built under these projects.

The Community Facilities Administration has signed contracts for 57 Federal loans to build housing and related facilities at colleges and universities, and 10 such loans to build housing for the elderly, all of which are subject to the order.

This is the housing administered by just one Federal agency, the Housing and Home Finance Agency. In addition as you know, VA-guaranteed loans made after November 20 also come under the order, as does housing under the jurisdiction of various other Federal departments and agencies.

In all this housing, every American is now assured, by the President's order, of an equal opportunity to buy a home or rent an apartment of his choice if he can afford it.

In addition, the President has called upon all units of the Federal Government to use their good offices to help achieve the equal opportunities we are seeking.

Needless to say, there are many other segments of our society who can and should use their own good offices to help make freedom for the free more meaningful.

Your work at this conference, in seeking appropriate legislation, both local and State, which will help reach this objective, is, as

I have said before, vital to our overall success.

But it is clear to all who know the history of human progress that the passing of a law or the issuing of an order will not, in itself, accomplish the desired end result. It requires the work and dedication of each of us, of government, of private citizens, of civic and fraternal organizations, of churches and of every other segment of our society to make certain that the goal is not illusory and that it is achieved through understanding and active support, not through grudging acceptance.

I think the events of the past hundred years—the progress we have made in civil rights—point to several conclusions. The first, and most hopeful, is that we have indeed come a long way since emancipation was first proclaimed. The second, and most challenging, is a realization of the distance we have yet to go to give true meaning and universal practice of the civil rights for all Americans.

This is something we must do because it is part of the foundation upon which this Nation was founded.

Realizing that, we cannot overlook the impact which our failure to assure equal opportunities has on the rest of the world—on the newly emerging nations, on our European allies, and, of course, on those who seek to defeat us and to achieve world mastery.

Recently the Colorado Supreme Court ruled on the validity of the Colorado fair housing law. Some parts of that ruling were a setback, in that certain key enforcement provisions the law included were struck down. But the court did uphold the constitutionality of the law itself, and it used some ringing language in asserting this position. It is appropriate perhaps to quote some of that language:

"When, as at present," the court proclaimed, "the entire world is engulfed in a struggle whether the American concept of freedom with equality of opportunity shall survive; when tyrannical dictators arrayed against this Nation in the struggle proclaim throughout the world, with some justification, that we do not practice what we preach, and that 'equality of opportunity' is a sham and a pretense, a hollow shell without substance in this Nation; we would be blind to stark realities if we should hold that the public safety and the welfare of this Nation were not protected by the act in question. Indeed, whether the struggle is won or lost might well depend upon the ability of our people to attain the objectives which the act in question is designed to serve."

Those words point up, better than I could, the world challenge of fair housing.

Now it is our responsibility to rise to that challenge—through enactment of laws and through the day-to-day working with others to make certain equality of opportunity is not a hollow shell but an accepted, agreed-upon practice in the land of the free.

In its report on the past hundred years of progress, the Civil Rights Commission also discussed the task ahead and concluded with these words:

"We have come a far journey from a distant area in the 100 years since the Emancipation Proclamation. At the beginning of it, there was slavery. At the end, there is citizenship. Citizenship, however, is a fragile word, with an ambivalent meaning. The condition of citizenship is not yet full-blown or fully realized for the American Negro. There is still ground to cover. The final chapter in the struggle for equality has yet to be written."

The whole purpose of this conference and of your participation in its discussions is clear and abiding evidence that you are aware of the task ahead and willing and eager to undertake it. This is the surest indication that there is the spirit and the will

to cover the ground yet uncovered and to bring about full citizenship for all Americans.

That is why we are here today—to help write the final chapter in human chronicle of civil rights in this Nation. May we write wisely and well, with the help of Almighty God, knowing full well that it is in His image we were all created.

Mr. CLARK. Mr. President, I thank the Senator from Nebraska for his courtesy in yielding to me.

ESTABLISHMENT OF WATER RESOURCES RESEARCH CENTERS

Mr. HRUSKA. Mr. President, the senior Senator from New Mexico [Mr. ANDERSON] introduced earlier in this session S. 2, a bill to establish water resources research institutes or centers at land grant colleges and universities, to stimulate water resources research at other institutions of higher education, and to promote a more adequate national program in this field.

The Senator from Nebraska gladly responded to the invitation to cosponsor this bill. It is a desirable and urgently needed measure. It should be accorded early hearings and prompt enactment. I shall do what I can to support and advance it.

PROVISIONS OF BILL IN GENERAL

S. 2 proposes Federal financial assistance to land-grant colleges and universities or other competent institutions of higher education in each State, as the State determines, to establish a universitywide water resources research institute or center, in the general pattern of the Hatch Act of 1887 which authorized the agricultural experiment stations. Each State center will be entitled to as much as \$100,000 annually on a continuing basis, plus matching funds for specific research or experimental projects. The Secretary of the Interior is also authorized to make grants, matching agreements and contracts with other colleges and universities, States and other governmental agencies, private foundations and other institutions, firms and individuals, to conduct water research projects within the scope of the Department of Interior's mission in the water field. An appropriation of \$5 million in the first fiscal year, increasing to \$10 million over the next 5 years, would be authorized.

The purpose of the bill is to implement recommendation No. 3 of the Senate Select Committee on National Water Resources. Specifically this select committee recommended that a coordinated research program on water be undertaken to include both research into ways to increase available supplies and ways to increase efficiency in the use of water required to produce manufactured goods and crops. In greater detail, the committee recommended that existing programs be strengthened by taking the following action—page 18 select committee's report No. 29, 87th Congress, 1st session:

(a) Expanding the programs of basic research dealing with atmospheric physics, solar activity, hydrology of groundwater movement and recharge, the physical chem-

istry and molecular structure of water, photosynthesis, climatic cycles, and other natural phenomena associated with water in all its forms. Such research is essential to a major breakthrough in such fields as short- and long-range weather forecasting, weather modification, efficient management of underground reservoirs, evaporation reduction, desalinization, and pollution abatement, as well as to major improvements in works for the storage and control of water.

(b) Providing for a more balanced and better constructed program of applied research for increasing water supplies through desalinization, weather modification, and evaporation and evapotranspiration reduction.

(c) Providing for an expanded program of applied research for water conservation. Special emphasis should be given to research on improved waste treatment methods, on ways of increasing efficiency in the agricultural use of water, on fish and wildlife needs, and on methods of system planning for the optimum development of water resources of river basins.

(d) Evaluating completed projects with a view to determining modifications to enable them more effectively to meet changing needs, to provide better guidelines for future projects, and to better determine their effect on the local, regional, and national economy.

The committee made four other recommendations. They will be discussed later.

NEED FOR ACTION

The future water needs of the Nation were thoroughly inquired into, studied and reported by the Senate Select Committee on National Water Resources organized in 1959. Extensive hearings were held. A report was made to the Senate in January 1961—Report No. 29, 87th Congress, 1st session.

The findings of the committee show how rapidly America is approaching the point at which shortages of available water supplies will constitute a significant barrier to our economic and social progress. It identified major portions of the United States, equal to more than one-fourth of the land area of the mainland States except Alaska, which by 1980 will have very little water to meet the requirements of expanding industry and a growing population. The committee further found that by the year 2000 this condition of water scarcity would extend to an area comprising virtually one-half of the land area of the 48 contiguous States. Maintenance of water quality will be a critical problem everywhere in the United States. Indications of this appear in our newspapers almost daily.

The demands on the Nation's water resources have increased tremendously in recent years. The present 300 billion gallons of daily withdrawal will double by 1980. These demands will triple by the year 2000. These computations are based on medium projections of population increase and on assumptions which include such factors as, first, that there will be continued growth of the Nation's economy at the same rate as in the past; second, that adequate water supplies will be made available under the present general pricing policies; third, that there will be relatively little change in presently known technical methods of water use; and fourth, that with the exception of increased application of tech-

niques for improving the efficiency of irrigation, present methods of using water will continue.

In the course of the testimony on "Supply of and Demand for Water in the United States as Estimated for 1980 and 2000"—see page 123 of report—there is found an outline and summary of three potential programs for meeting water demands. Each is designed for meeting demands under different assumptions, but all are for assumed medium levels of population and economic growth; a maximum storage-minimum treatment program; a minimum storage-maximum treatment program; and a minimum cost program which would provide for meeting needs at the least cost.

Capital costs of these three programs range from \$54.2 to \$74.3 billion by 1980. The range by the year 2000 is from \$99.6 to \$118.3 billion.

The report then makes this very challenging statement:

Regardless of which of the programs is adopted, five regions, the upper Missouri, upper Rio Grande and Pecos, Colorado, Great Basin and South Pacific, will be short of water under the assumptions made, and will require maximum regulation by 1980.

Mr. President, this brings the problem very close to home for all people of my State because "upper Missouri River region" contains the entire State of Nebraska, among other neighboring States. In fact, Nebraska is the only State which lies entirely within the boundaries of the Missouri River Basin.

In other words, the States in the five water regions referred to will be required to develop fully all available water resources by 1980 or earlier if the projected increase in population is experienced and economic activity is to be achieved.

The year 1980 is only 17 years away.

The foregoing information is just an indication of the startling statistics and other disclosures contained in the select committee series of 32 committee prints issuing its studies. They cause thoughtful individuals to pause; to wonder at the benefactions of nature which has so generously provided for our wants until now; and to consider seriously the methods we must adopt and means we must provide in order to conserve, develop, and wisely use water upon which all human endeavor so heavily depends.

Later in my remarks, I shall discuss the Nebraska situation in greater particular.

WHAT CAN BE DONE

The select committee made five principal recommendations, each of which is supported by voluminous material. Briefly stated, these recommendations are:

First. The Federal Government, in cooperation with the States, should prepare and keep up to date plans for comprehensive water development and management for all major river basins of the United States.

Second. The Federal Government should stimulate more active participation by the States in planning and undertaking water development and management activities by setting up a 10-year program of grants to the States for water resources planning.

Third. The Federal Government should undertake a coordinated scientific research program on water.

Fourth. The Federal Government should prepare biennially an assessment of the water supply demand outlook for each of the water resource regions of the United States.

Fifth. The Federal Government in cooperation with the States should take steps to encourage efficiency in water development and use.

The recommendations are based on the committee's belief that future water demands can be met best by a proper combination of the following efforts: (a) construction program; (b) scientific research; (c) development of known technical methods; and (d) strengthening of government policies affecting water development and use. However, the Select Committee Report wisely observes:

Such a combination of efforts cannot be achieved overnight, and will require the combined efforts of the legislative and executive branches of the Federal Government, as well as a continuation and strengthening of work in these fields by State and local governments and private enterprise.

FEDERAL LEGISLATION TO ACHIEVE RECOMMENDATIONS

However desirable and well considered any recommendation may be, a proposal to implement it legislatively must also be politically acceptable.

This became very clear two summers ago when the Senate Interior and Insular Affairs Committee sat with the Senate Public Works Committee in hearings on S. 2246, the President's water resources planning bill. This measure was designed to implement the select committee's recommendations 1 and 2 by providing machinery for development of major river basin plans by 1970 and to provide the recommended aid to the States for participation in planning work.

It encountered stern resistance from those who vigorously contend that State water rights are paramount to Federal rights in that field; that they have been for a long time as a matter of national policy; and that they should remain so. This position has been asserted often in the past 50 years since there was first boldly proposed a comprehensive Federal planning program. The concept of national planning was directly opposed to the position maintained for a century and a half and more that the citizens of the individual States have had the powers and responsibilities for the control, use, and development of the water resources within their State boundaries in accordance with local needs and conditions. At any rate, the result of this fundamental, sharp, and irreconcilable conflict of philosophies with regard to the President's bill in the 87th Congress was a complete stalemate.

Since that time, determined effort has been made to agree upon and develop a common ground which opponents on this point can occupy. Senator ANDERSON optimistically noted that some progress has been made, and that the President's proposal to implement legislatively the select committee's recommendations 1 and 2 is being so modified as to prompt

him to hope that there will be broader acceptance of the modified 1963 version than there was of the 1961 bill.

Parenthetically, the Senator from Nebraska joins in the hope that sufficiently common ground can be found. I am in full agreement with the statement that there will be water planning the Nation over, because of the growing pressures for water. Planning of some kind will be undertaken whether Congress provides an orderly method or not. It behooves every interested person to exert utmost good faith and diligence to the end that a workable and acceptable method be found as expeditiously as possible.

However, not any price can be paid for such a result. As important as the objectives of the 1963 administration bill for recommendations 1 and 2 are, the fact remains that they are not the sole considerations. The convictions held by so many that citizens of individual States have recognized powers and responsibilities as to control, use, and development of water are deeply held as being vital to continued survival of social and economic progress over the Nation. This is especially true in the semi-arid States. The idea of surrendering long-held State preferences in this field leaves them very cold indeed. They will not compromise unduly; nor will they capitulate easily. And they should not.

PHILOSOPHIC BASIS OF S. 2

One direct result of the State-Federal conflict over water supremacy encountered in the last Congress is that S. 2 resorts to the time honored and very successful Hatch Act concept. This approach avoids the bitter struggle and probably hopeless strife as to paramount water rights.

The Hatch Act, originally enacted in 1887—a revision and codification was enacted in 1955—created an agricultural experiment station system at the land-grant colleges and States universities. The pattern of State-Federal cooperation established some 75 years ago has been very successful.

Under the Hatch Act splendid teaching and scientific talent has been made available for the study and teaching of basic scientific endeavors, as well as coping with practical problems of agriculture. Education and research have been combined. Highly trained personnel serve State and individual needs for new and useful information. How well this concept has worked is widely known. American agricultural production and experimentation are the wonders and envies of the world.

Because of its general acceptance, the Hatch Act concept was applied in the drafting of S. 2.

Senator ANDERSON frankly and proudly states that S. 2 is "an effort to copy and expand the agricultural experiment station system and the pattern on which it was built." In his remarks on introducing S. 2, he pointed out that the bill proposes Federal financial assistance to land-grant colleges and universities or other competent higher educational institutions in each State, as the State

determines, to establish a university-wide water resources research institute or center in the general pattern of the act authorizing the agricultural experiment station. He specifically pointed out—page 186 CONGRESSIONAL RECORD for January 14, 1963:

The program does not meet the need for expansion of direct Federal research work on important water problems like pollution control, weather modification and saline water conversion, nor the need for the Departments of the Federal Government, other than Interior, to use the colleges and universities on research projects in their fields of responsibility. Just as the agricultural experiment stations supplement Federal agricultural research at Beltsville and many other direct Federal agricultural laboratories and research centers, the water research program proposed in this bill would supplement present programs of Federal agencies, not supplant them.

The Senator from Nebraska fully concurs with these declarations.

COST OF PROGRAM

Cost of the program will be of deep concern and great interest to all, and properly so.

Question 1. Can we at this juncture of high taxes and Government spending and the highest Federal Government deficits afford to embark on a research program which authorizes expenditure of approximately \$50 million in the next 5 years for this limited water development program?

Question 2. Can the Nation afford a program which the select committee estimates at a gross of some \$54 billion to the year 1980 for storage, waste collection, and treatment over all levels of Government?

These sums are astronomical. Perhaps they can be scaled down. But if we extended the period by 10 years to 1990 and would reduce the expenditures by \$10 billion, they still sound pretty much out in the realm of the stars.

In an effort to answer these questions, let us reconsider the report of the select committee:

Regardless of which of the (three potential) programs is adopted, five regions, the Upper Missouri, Upper Rio Grande and Pecos, Colorado, Great Basin, and South Pacific, will be short of water under the assumptions made, and will require maximum regulation by 1980 (p. 124).

Mr. President, this is the answer to questions 1 and 2. In the light of the quotation from the report, we can readily paraphrase both of the questions as follows: "Can the economy of the United States continue to grow and prosper—or even to exist—with inadequate supplies of water for our population, our agriculture, and our industry?"

To ask the question is to answer it.

NEEDS WILL BE SUPPLIED

In one way or another, these water needs will be supplied. They must be. As an intelligent, energetic people with some eye to the future, we should go about it sensibly—not haphazardly or tardily. S. 2 is a sound first step. Solidly worked out in concept and in operational methods, the bill will be successful if we give it a chance. It will imple-

ment recommendation 3 of the select committee report relating to research.

Mr. President, as for recommendations 1 and 2, the Senator from Nebraska would rather await the introduction of a bill stating in precise and specific language what will be undertaken before making comment. It is my earnest hope that the measure in process of preparation will be sufficiently possessed of "broader acceptance" than the 1961 version. If it does not, it will be opposed. It should be.

Meantime, the task at hand as to S. 2 is one upon which we will find wide agreement. We should proceed in advancing it with such dispatch as we can command.

NEBRASKA'S INTEREST

My home State has been conscious of and highly concerned with water from the time it entered the Union. As a reclamation State, this is understandable.

Our long-time, keen interest, and participation in the Pick-Sloan plan typifies the interest expressed in water resources. All of the State's eastern boundary and a part of its northern line are formed by the Missouri River.

It is with gratification that we witness the substantial completion of the main-stem system of reservoir projects. After years of study, planning, and construction, the vision of farsighted men is materializing in the 90 percent completion of reservoir construction. Eighty percent of ultimate water storage is now available, and 60 percent of the ultimate power capacity is now on the line. Over and above these advantages we have the very vital assurance of water for navigation, industrial, and domestic purposes, fish and wildlife, and recreation.

In this connection we are aware of two factors: First, all of these attainments were pursuant to a plan conceived and authorized by law nearly 20 years ago. Many changes have occurred since then in technology and objectives. Second, the main-stem development is only a part of the development of water resources. There remain the vast demands of geographical and population areas away from the Missouri River main stem for available supplies of water. Likewise, short-term as well as long-term needs must be provided for and planned.

Many water storage and supply structures and works have been completed within our State. Others are under construction, while still others are in the planning or study stages.

We have reached, and maybe gone well into the stage where specific water problems claim immediate attention. In approaching them it would be extremely helpful to have the advantage of scientific studies made by our university addressed to our specific needs, in addition to the general value such analysis would have.

This is particularly apparent when we consider the legislation pending before the current session of the Nebraska State Legislature.

ADVANTAGES TO NEBRASKA

The advantages in having these studies prepared can also be seen by considering the following general propositions:

First, there are several irrigation projects either under construction or in planning in the Lower Loup Valley. It is important to know their ultimate effect upon the streamflow in lower river reaches after these projects are completed.

Second, the effect these and other projects will have on domestic water supplies and their priority under the constitution.

Third, comprehensive studies should be conducted on the subject of the supply of underground water in Nebraska.

We are disposed to think that it is an inexhaustible supply and earnestly hope it will always prove to be. But if future studies will show some indication in years ahead of depletion, it is essential to have technical advice on what system of appropriation to apply to prevent overpumping and what system of priorities to apply with reference to the various 24,000 wells now in existence. In this connection it would be important to know whether these priorities should be on a statewide basis or on a river valley basis and where the boundaries of such valleys are if that will be the area unit.

Hand in hand with this will be discovery and early adoption on a wide basis of more efficient uses and storage practices of this precious natural resource.

All of these and many other subjects of inquiry will fall within the purview of recommendation No. 3 of the report on national water resources, as implemented by S. 2.

All of these subjects will be embraced within the activities of the basic research, studying ways to increase available supplies and methods to increase the efficiency in the use of water required to produce manufactured goods and crops.

Hence, it is readily seen that for the State of Nebraska, in common with all of the reclamation States, and indeed all the States without regard to their geographic location, S. 2 is of highest importance.

It is to be hoped that all of these approaches will be thoroughly canvassed so that the best possible legislation for the purpose at hand can be achieved by this bill.

Mr. President, I suggest the absence of a quorum.

The PRESIDING OFFICER. The clerk will call the roll.

The legislative clerk proceeded to call the roll.

Mr. SMATHERS. Mr. President, I ask unanimous consent that the order for the quorum call be rescinded.

The PRESIDING OFFICER. Without objection, it is so ordered.

PRIVATE ENTERPRISE HELPS DEVELOPING NATIONS

Mr. MILLER. Mr. President, with all of the attention that has been given to the Alliance for Progress and our foreign aid program, there has been an

unfortunate tendency to regard assistance to the developing nations as a prerogative of the Federal Government or the United Nations. So it is refreshing and encouraging when one learns that a nongovernmental, privately financed program is rapidly moving into a substantial undertaking of helping a substantial number of people in the developing nations to help themselves, and particularly to help themselves develop within the framework of the capitalistic economic system.

I refer to an organization known as Self-Help, Inc., an Iowa-born private foundation established 12 years ago by one of Iowa's leading citizens, Mr. Vern Schield, an industrialist and farmer from Waverly, Iowa. This organization has a program of collecting used and idle farm equipment which is unsuited for the competitive demands of modern, large-scale agricultural production, reconditioning the equipment, and putting it into the hands of farmers in developing nations where it will aid and advance their farming methods. The equipment has been sent to overseas missions as well as to individuals or organized groups of farmers at a fraction of the cost of new, more modern machines. Rather than using the "handout" approach, the machinery is sold on a pay-as-you-work basis, with no interest on the unpaid balance. Shipping costs are held to a minimum by combining Self-Help loads with other shipments. Collection of the used machinery has been assisted by various Iowa and Minnesota Future Farmers of America chapters, and the job of reconditioning is being assisted in the vocational agriculture shops in those States.

The foundation is financed through private contributions from individuals and organizations, and it is rapidly receiving the attention which it deserves to bring it into nationwide operation.

Mr. President, I ask unanimous consent that articles from the Des Moines Sunday Register, the Minneapolis Sunday Tribune, and the Farmer magazine, giving additional accounts of Self-Help, Inc., be inserted in the RECORD.

There being no objection, the articles were ordered to be printed in the RECORD, as follows:

[From the Des Moines Register, Oct. 8, 1961]
MACHINERY FROM IOWANS AIDS PEOPLE IN 23 NATIONS

(By George Mills)

WAVERLY, IOWA.—Vern Schield believes in sending farm tractors to do the Lord's work overseas.

Schild, devout Waverly industrialist, is the guiding spirit and major financial angel of Self Help, Inc.

That organization is sending from Iowa in 1961 an estimated \$50,000 in reconditioned farm machinery and other equipment to lands of hungry peoples. Real value of the equipment would be nearer \$150,000, he said.

TWENTY-THREE COUNTRIES

Over the years, he has sent machinery to inhabitants of 23 countries through missionary stations of various faiths in Asia, Africa, and Latin America.

Schild, 58, works on these two principles: Peoples of less-developed nations must be encouraged and helped to increase their own production of food.

They should buy the needed equipment (on a low-cost basis) rather than accept handouts, which have a pauperizing effect. "Helping others to help themselves is Christianity in action," he said. "It also is basically American. Helping others to rise to a higher standard of living also is important if world peace is to be achieved."

DEFICIT AHEAD

Schild has a major growing problem. He cannot, and does not want to, charge as much for the machinery as he has invested in it. As a result, Self Help is headed for a deficit of perhaps \$25,000 this year and seeking contributions.

He has been contributing approximately \$10,000 of his own money to the program each year (plus a lot of time). In addition, he has lent the setup \$20,000 this year to pay the bills. It is said that he donated and lent nearly \$50,000 to the movement in recent years.

"One man can't do this whole thing," he said. "I've got to have help."

He was particularly pleased when the Waverly Lions Club voted 41 to 4 by secret ballot to cash in a \$500 Government bond and donate the money to Self Help.

Self Help was incorporated by Schild 2 years ago and now has an executive director, Ernest E. O'Neal, a onetime Methodist mission worker.

Schild, 5 feet 5 inches and 155 pounds, is founder and chairman of the board of the Schild Bantam Co., which employs 300 persons in this Bremer County-seat town of 6,357 population. The company makes power cranes, excavators, and similar equipment.

Schild became particularly interested in the plight of the less-developed countries in travels around the world in behalf of the Bantam Co.

He visited mission stations of all faiths. "The church schools are wonderful," he said. "The soil is excellent. There is plenty of rainfall. But nothing much was being produced in the way of food. They didn't have the know-how."

Schild embarked on a course of action based on this biblical verse (James 2: 14-17): "What does it profit * * * if a man says he has faith but has not works? If a brother or sister is ill-clad and in lack of daily food, and one of you says to them, 'Go in peace, be warmed and filled,' without giving them the things needed for the body, what does it profit? So faith by itself, if it has no works, is dead."

Over the last 10 years, Schild has been the principal force in the shipment of 23 carloads of machinery overseas. (Eight carloads have gone out so far this year.) He reports that spectacular crops have resulted in many instances.

IN BRAZIL

Land 600 miles in the interior of Brazil is producing corn averaging 50 bushels to the acre, he says, on land "all cleared with Self-Help machinery."

A grinder sent to Nigeria turned out as much fine flour in 20 minutes as a native woman could grind in 2 weeks.

In Kenya Colony, Africa, land worked with a tractor and other equipment produced 60 bushels of corn to the acre, five times as much as the output with the old hand-hoe agriculture.

Machinery has gone to missions of Presbyterian, Catholic, Baptist, and other faiths as well as to Methodist outposts, Schild says.

ORDERS ON HAND

On the Self Help order books now are requests for:

A crawler tractor, bush cutter, disc harrow, and other equipment for an Adventist college in west Nigeria, Africa (total order \$2,603); a big diesel tractor, a subsoiler, and

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ments in kind, plus reasonable carrying charges.

"The definition of feed grains has been revised to include oats and rye if the producer so requests, in which case the producers could if they so desired, to have feed grain acreage devoted to the production of wheat considered as devoted to the production of feed grains. However, corn, grain sorghums, or barley shall not be planted in lieu of oats or rye.

"The bill contains a number of other provisions, some of which are generally similar to those in effect under the current program, such as (a) the requirement to increase the acreage of cropland devoted to conservation, summer fallow, and idle by the number of acres diverted, (b) the acreage diverted may be used for designated crops with the land diversion payment not more than one-half the rate which would otherwise be applicable, (c) up to 50 percent of the price support and land diversion payments may be made in advance of determining performance, and (d) authority to exempt malting barley."

5. FOREIGN TRADE. Rep. Ryan inserted a speech by Harold Wilson, expressing fear that anything done in freeing trade and expanding national production would "run in a measurable period of time into a crisis of world liquidity." pp. 5512-4

Rep. Harsha criticized the Commerce Department for issuing export licenses authorizing shipment of strategic materials to Communist nations. p. 5517

6. PERSONNEL; RETIREMENT. Received from the Civil Service Commission a proposed bill "to amend the automatic-separation provisions of the Civil Service Retirement Act"; to Post Office and Civil Service Committee. p. 5523

7. BUILDINGS. The Rules Committee reported a resolution for consideration of H. R. 5207, to authorize additional appropriations for foreign buildings including Agricultural Attache housing. p. 5524

SENATE

8. WILDERNESS PRESERVATION; FORESTRY. Began debate on S. 4, to provide for the establishment of a wilderness preservation system (pp. 5544-62). Agreed to the committee amendments en bloc and the bill as amended will be considered as original text for the purpose of further amendment (pp. 5546-9). Agreed to a unanimous-consent agreement limiting to one hour debate on each amendment and on the question of final passage. (p. 5551).

Sen. Allot submitted amendments intended to be proposed to this bill, S. 4. p. 5534

9. YOUTH EMPLOYMENT. The Labor and Public Welfare Committee reported (on Apr. 5, during adjournment of Senate) with an amendment S. 1, to authorize the establishment of youth employment programs, including a Youth Conservation Corps (S. Rept. 111). p. 5526

Sen. Yarborough urged enactment of the youth employment program bill as "a necessary step toward beginning to solve some of the problems our urban industrialized economy has created for today's youth." p. 5541

Sen. Goldwater submitted an amendment intended to be proposed to this bill, S. 1. p. 5534

10. WATER RESOURCES; RESEARCH. The Interior and Insular Affairs Committee reported without amendment S. 2, to provide for the establishment of water resources research centers at land-grant colleges and State universities (S. Rept. 117), p. 5528

11. RECLAMATION. The Interior and Insular Affairs Committee reported (on Apr. 5, during adjournment of the Senate) without amendment S. 982, to permit the

Secretary of the Interior to continue to deliver water to lands in the third division, Riverton reclamation project, Wyo. (S. Rept. 112). p. 5526

12. FOREIGN AID. Sen. Fong criticized expenditures for some of the projects under the foreign aid program and urged a "thorough overhaul" of the program. pp. 5540-1
13. ELECTRIFICATION. The Interior and Insular Affairs Committee (on Apr. 5, during adjournment of the Senate) voted to report (but did not actually report) S. 1007, to guarantee electric consumers in the Pacific Northwest first call on electric energy generated at Federal hydroelectric plants in that area. p. D210
14. CONGRESSIONAL ORGANIZATION; TESTIMONY. Sen. Clark urged a reorganization of Congress to expedite its work, suggested that Cabinet officers be permitted to appear before joint meetings of committees having jurisdiction over the same subject matter, and inserted a table showing the amount of time spent by Cabinet officers in appearing before congressional committees during the 87th Congress. pp. 5565-7
15. TRANSPORTATION. Received a Vt. Legislature resolution protesting a proposed increase in truck rates charged by southern carriers. pp. 5527-8
16. AREA REDEVELOPMENT. Sen. Douglas announced that hearings by the Subcommittee on Production and Stabilization of the Banking and Currency Committee on S. 1163, to amend provisions of the Area Redevelopment Act, will begin Apr. 30, instead of Apr. 22 as previously announced. p. 5534
17. APPROPRIATIONS. The "Daily Digest" states that the subcommittee of the Appropriations Committee completed hearings Apr. 5 on fiscal 1964 budget estimates for this Department and related agencies. p. D209

ITEMS IN APPENDIX

18. PUBLIC WORKS. Extension of remarks of Rep. Kee urging Congress to appropriate the full \$500 million requested by the President for the vital accelerated public works program. p. A2061
Extension of remarks of Rep. Blatnik inserting a list of the accomplishments of the accelerated public works program. pp. A2100-1
Extension of remarks of Rep. Patman inserting a list of project applications pending under the accelerated public works and Area Redevelopment programs. pp. A2110-42
19. MANPOWER TRAINING. Extension of remarks of Rep. Curtis inserting two articles which "point out the non-Federal work which is being done in retraining." pp. A2062-3
20. EMPLOYMENT. Extension of remarks of Rep. Curtis inserting an article urging "greater attention to specific measures to combat unemployment rather than pin too much hope on general fiscal and monetary policies designed to increase aggregate demand." p. A2067
21. ASC COMMITTEES. Extension of remarks of Rep. Randall paying tribute to the "farmer ASCS committeemen who administer most of the action programs of the Department of Agriculture." pp. A2076-7

WATER RESOURCES RESEARCH CENTERS

APRIL 8, 1963.—Ordered to be printed

Mr. ANDERSON, from the Committee on Interior and Insular Affairs,
submitted the following

R E P O R T

[To accompany S. 2]

The Committee on Interior and Insular Affairs, to whom was referred the bill (S. 2) to establish water resources research centers at land grant colleges and State universities, and to stimulate water research at other colleges, universities, and centers of competence, having considered same, report favorably thereon and recommend that the measure do pass.

BACKGROUND

A series of studies by commissions of experts, the Senate Select Committee on Water Resources, and the Council for Science and Technology have startled Americans with the fact that we are well into a period in which acute water crises and supply shortages are spreading across the Nation.

The burgeoning southwest Pacific region in southern California, including Los Angeles, has long depended upon water transported hundreds of miles from outside its own watersheds. A new California water plan to move water from the northern part of the State to the South has been developed. The cost runs into billions of dollars.

Arizona is today "mining" ground water at the rate of 2 million acre-feet per year (4 million acre-feet are pumped and only 2 million acre-feet are percolating back into the underground aquifers).

By the year 1980 the south Pacific, the Colorado River Basin, the Great Basin, the upper Rio Grande-Pecos, and the upper Missouri River Basins will all be at or beyond the limit of their water supplies. By the year 2000, according to the Senate select committee and the Council for Science and Technology,¹ under present methods of man-

¹ See report of the Senate Select Committee on National Water Resources, Rept No. 29, 87th Cong., 1st sess., pp. 10-11. Also, "Report to the President on Water Resources Research" prepared by the Council for Science and Technology, submitted to Congress Feb. 15, 1963, by President John F. Kennedy and published as a committee print by the Committee on Interior and Insular Affairs, Mar. 25, 1963, p. 13.

agement and utilization, water requirements will exceed usable supply in the following water regions, including all or parts of the States indicated in each instance:

South Pacific.—California.

Great Basin.—Nevada, California, Utah, Oregon, Idaho, and Wyoming.

Delaware-Hudson.—Delaware, New York, New Jersey and Pennsylvania.

Upper Arkansas-Red Rivers.—Colorado, Kansas, New Mexico, Oklahoma and Texas.

Great Lakes basins.—Indiana, Michigan, New York, Ohio, Pennsylvania, Illinois, Minnesota, and Wisconsin.

Western gulf.—Louisiana and Texas.

Upper Missouri.—Colorado, Iowa, Kansas, Minnesota, Montana, Nebraska, North and South Dakota, and Wyoming.

Rio Grande-Pecos.—Colorado, New Mexico, and Texas.

Colorado River.—Arizona, California, Idaho, Nevada, New Mexico, Utah, and Wyoming.

PROSPECTIVE WATER FACILITY COSTS

Cost of water facilities of all types—public and private—are now running \$10 billion a year. The Department of Commerce has estimated necessary investment in water facilities from 1959 to 1975 at \$171 billions.

The Council for Science and Technology, after explaining that by A.D. 2000 we will require water equal to 75 percent of total runoff in the Nation, compared to today's 25 percent adds:

To obtain, as an assured supply, such a large fraction of the total runoff would require structures for storage, regulation, transportation, and distribution that would be far more expensive, in proportion to present structures for this purpose, than the proportionate increase in the amount of withdrawal. If surface storage were used, the required storage sites would intrude on areas already intensively occupied or needed for urban and industrial development. The total capital cost would be several hundred billion dollars, and annual charges would be of the order of tens of billions. Technological and economic developments leading to marked reductions in future requirements for water withdrawal, to lowering of the unit cost of water structures, and to greater utilization of underground storage are clearly desirable. Otherwise, both the economic and social costs of meeting future water needs will be painfully high.

Research offers increasing opportunities to effect the needed savings, the Council for Science and Technology report finds. It states:

Research in recent years has led to spectacular savings in construction and operating costs and to provision of structures and facilities that function more efficiently and have a longer effective life. But opportunities and needs for further research-induced economies and other benefits are now greater than ever. Expanding scientific knowledge, improved instruments for measuring and transmitting data,

electronic computers for collating and analyzing the data, and other technological advances have enhanced opportunities for even greater research gains than have previously existed and, thereby, for comparatively revolutionary advances in the tools and techniques of water resources development.

RESEARCH NEEDS

Research all the way around the hydrological cycle is needed, including both basic and applied, or practical, research undertakings.

Water, as an element, is worldwide. Much research, both basic and applied, will have broad and worldwide value.

But water problems vary with the environment in which the element occurs—the differences in soils, climate, industry, population, vegetation, geology, topography, and even legal, social, and economic arrangements, to mention only a few.

The adequacy of usable water supplies in the critical water basins enumerated above depends, not on a single solution applicable to all areas, but on solutions that will vary with each of them. In most of the western areas listed above consumptive uses and inadequacy of total water supply will be the major cause of shortage. In the central and eastern areas, flow requirements under present methods of waste dilution will be the major limiting factor.

The Senate Select Committee on Water Resources, in its report in January 1961, indicating some of the fields of research in which work needs to be accelerated, said:

* * * the committee believes that substantial research efforts are justified, looking toward exploration of all possibilities for increasing usable water supplies or making more efficient use of present supplies, by such means as:

(a) Reducing evaporation from the surface of reservoirs.

(b) Elimination of water-loving vegetation (phreatophytes) along the edges of watercourses and reservoirs.

(c) Changing or modifying a forest and vegetative cover on watersheds to reduce evapotranspiration.

(d) Reducing seepage losses in irrigation canals and other water distribution systems and other wasteful practices.

(e) Reduction of dilution requirements for pollution abatement by development of improved methods for treatment or control of waste materials that are disposed of in water.

(f) Waste water salvage.

(g) Reuse, recycling, and elimination of wasteful water use by industry.

(h) Desalting of saline or brackish water.

(i) Weather modification.

(j) More accurate quantitative forecasting of meteorologic events.

(k) Application of nuclear products in research.

(l) Improved use and control of ground water.

Additionally, the committee suggested that, in the field of economics and social sciences, research should be undertaken on:

- (a) Economic incentives to assure conservation and better use of available supplies.
- (b) Alternative uses of water.
- (c) System planning.
- (d) Economic effects of existing projects.

Our present Federal expenditures for water resources research are approximately one-half of 1 percent of annual investment in facilities, far below comparable rates in other public and private investment fields.

THE NEED FOR HYDROSCIENTISTS

We cannot vastly increase water research speedily if we would. The needed hydroscintists are not available. Experts in related fields must be recruited to specialize in the water field. Greatly increased numbers of the presently sharply limited cadre of hydrologists, hydroengineers and hydroscintists of many disciplines must be trained to staff an adequate national water research effort.

The Nation must "lift itself by the bootstraps" and train the scientists it needs to do necessary water resources research work while research is being done.

PURPOSES OF S. 2

S. 2 proposes to undertake such a two-pronged effort by repeating in the water resources field, under the direction of the Secretary of the Interior, whose Department is most involved in water research programs both in terms of dollars and areas of interest, what has been so outstandingly successful in agriculture—the establishment of water research agencies in the land-grant colleges and State universities of the Nation, or some other institution of higher education within a State, as the State elects.

Title I of S. 2 is essentially a copy of the Hatch Act of 1887 which brought about the establishment of the agricultural research stations at land-grant colleges and State universities. It will assure each State an opportunity to have a collegewide, or universitywide, water research center where basic research and study of practical water problems in the State or area can be undertaken and students can be trained for careers in the hydrosiences while aiding on useful and needed research projects.

The encouragement of 50 water research institutes, or centers, in the Nation as proposed in S. 2 has been a considerably debated problem.

S. 2 authorizes two or more States to pool funds available through the bill in a single center and gives the Secretary of Interior ample authority and freedom to encourage States to cooperate in that manner, as is undoubtedly desirable in some instances.

The committee feels, however, that State-oriented water research centers are desirable for a number of reasons, and that concentration of extramural research work in the water field supported by Federal agencies in a few "centers of excellence" would not achieve some much needed results.

There are water problems in every State, county, city, industry, farm and even home of the Nation—everywhere water is used. There

is therefore need for centers, within reach of water users, which are located in educational institutions which have some responsibility to meet public needs for informative guidance and research.

The variation in problems, from the universal need for greater basic knowledge of the nature of water as an element to the location and capacity of an aquifer to provide underground water for some small community or individual tract or location, makes dispersal desirable.

Dr. D. F. Peterson, dean of engineering, Utah State University, emphasized the local nature of many applied research needs, and the capability of the colleges and universities to make knowledge available broadly, in summarizing his testimony:

* * * many of the problems of applied research will have to be attacked item by item, location by location. Water resources development must be closely linked to community and even individual objectives and I believe the State research efforts will greatly assist the States in discharging their responsibilities in planning and development.

Bringing the universities into the picture has many advantages besides the production of increased manpower. Universities since World War II have demonstrated their capability in administration of research. The interdisciplinary resources of the university should accelerate the progress of basic and interdisciplinary research. In the university, research and teaching work together not only to develop the body of new knowledge, but with the same effort to spawn the manpower capability which can carry the new knowledge to common practice.

The pressing need for hydroscintists, and for widespread opportunity for students to be attracted into the field, also makes desirable the establishment of centers as widely as can soundly be done.

"Genius is where you find it," Dr. Daniel G. Aldrich, of the University of California, remarked to the committee. "* * * there is no State in this Union, or no region in this country that has a corner on brains * * *. Providing the catalyst that sets in motion the creative ability of people in the 50 States will enable us to get further ahead * * *."

The panel of State university educators who appeared before the committee on S. 2 verified the belief of its authors that on the faculties of colleges and universities there are many able scholars in fields or disciplines related to water resources, who are not now engaged in research, who could be recruited to specialize and work on water problems if institutes or centers were established which offered them a continuing opportunity to serve in the field—not just a one-time research job.

Dr. Wilson H. Elkins, president of the University of Maryland, told the committee:

One of the main questions in connection with manpower is that of where do we get the personnel to do the research at the present time. I think that this manpower is available, as has been indicated previously, at our land-grant colleges and universities. Water research is a subject that requires an interdisciplinary approach. And there are many individ-

uals within various disciplines in the colleges who have some competence to do research in this field. By bringing them together in a center such as provided in this bill, I think that we will provide a much larger group of people that can do substantial and worthwhile research.

When the Hatch Act was passed in 1887 providing for the agricultural experiment stations, there weren't people available to do all the work in just specifically the area of agriculture. They had to draw upon the sciences and other fields to find people to do this kind of work. But in time they got a large number of people involved in it, and they also provided a number of people as they went along with the research program and the teaching program in the land-grant colleges and State universities.

As has been indicated, as we go into the research field in considerably more depth * * * there will be added to the number of personnel a rather large group of people who are not now attracted to the field of water resources * * *.

USING COLLEGES AND UNIVERSITIES

The need for wider use of colleges and universities for research and training of greater numbers of needed scientists has been widely recognized.

Report No. 1 of the President's Science Advisory Commission on "Meeting Manpower Needs in Science and Technology," declares:

Additional first-rate educational opportunities should be located in such manner as to serve all geographic areas more effectively. Centers of excellence serving more regions and States would stimulate and spread economic progress because, as recent experience has shown, industry tends to concentrate around leading institutions of science and technology. In addition to enlarging present programs, special arrangements will be required to assist areas of the country which now possess inadequate foundations for an effective graduate education program.

The President's Committee also found:

Nowhere are the benefits of scientific research more dramatically revealed than in food production. Fifty years ago in this country an agricultural worker produced food for only 3 or 4 others in contrast to his capability to feed 27 individuals today.

This accomplishment can be directly attributed to research that has been systematically supported by the Federal Government, the States, and private sources, in programs that have historically and effectively linked education and research. As a consequence, universities have been eminently able to meet changing needs.

The Committee on Natural Resources of the National Academy of Sciences, National Research Council, in its study of the status of natural resources research for the President, has come to the conclusion that:

In adapting their research programs and activities to the requirements of the problems outlined in this report, governmental and nongovernmental agencies and institutions should take full advantage of the resources of the universities, contracting out especially those studies for which the universities are uniquely equipped. It should be remembered that an important byproduct of the university research is the training that accompanies it, and the Committee reemphasizes the need for training research workers to deal effectively with the problems relating to natural resources. These problems require closer cooperation between natural and social scientists.

The National Academy group concluded that the Federal Government should "enlist the potentials of land-grant institutions" and that:

These institutions should be encouraged to extend their interest to cover the total span of natural resources, particularly as they relate to the future well-being of the areas they serve. For example, these institutions in the coastal States could develop fisheries experiment stations similar to the agricultural experiment stations which have so successfully aided the development of agriculture in the United States.

The faculties of these universities should be called upon to serve as advisers and assistants to local and State agencies with responsibilities for resource development, planning, and management.

The Water Resources Committee of the National Academy study, headed by Dr. Abel Wolman, of Johns Hopkins University, emphasized the need for interdisciplinary training of personnel. They reported:

The most critical shortage in the field of water resources by far is the very real shortage of broadly trained people capable of planning and executing effective research programs. At present, we have no institutional structure in the United States to take care of multidisciplinary research in water. The whole hydrosciences field is now pathetically limited for the tasks involved. To strengthen it will require immediate provision of a program to enlist and train new people in a great many of the disciplines relating to water resources. The ultimate objective should be the development of a new structure and a new generation of well-rounded water scientists ready and able to approach the Nation's multidisciplinary water-resources problems in a unified manner as hydrosciences.

The group studying social and economic aspects of natural resources, under Dr. Gilbert F. White, of the University of Chicago, for the National Academy reported:

* * * much of the needed study (in natural resource fields) will cut across conventional lines of Government bureaus and university departments * * *.

One of the more promising channels for this research is in the system of land-grant universities and regional agricultural

research institutions. Acceptance by them of enlarges responsibilities in the field of natural resources would be a reasonable extension of their present rapidly shifting activities.

It is just such multidisciplinary research and training, called for by Dr. White's group and by Dr. Wolman's group, that is envisioned in the provision of S. 2 that water resources research institutes or centers established under the bill should be collegewide, or university-wide, involving all disciplines.

The committee feels that old-line hydrologists who attempt to cling tenaciously to a narrow concept of water science, and attack broader, multidisciplinary research and training proposals as potentially wasteful, are out of step with the times.

There is a great need for hydrologists with a broad education and training. The Universities Council on Hydrology (UCOH), which is undertaking to encourage the education and training of "scientists trained to work on hydrologic problems from a broad base in the fundamental sciences" is rendering a great service to the Nation in taking a constructive, affirmative approach to the need.

The committee notes that two leaders in that council, Dr. Aldrich, of the University of California, and Dr. Peterson, of Utah State University, quoted above, were among the effective proponents of S. 2 at its hearings. Dr. Aldrich is chairman of the board of the University of California Water Resources Center which sponsored and financed the original conference of universities at which UCOH was established.

The most recent support of the basic objectives of S. 2 and of programs proposed in it is contained in the report to the President prepared by the Council for Science and Technology, and transmitted to Congress by the President.

In its legislative findings, the council's task group found:

New legislation is needed to strengthen substantially the contributions that the universities can make to research and graduate education in water resources.

(a) All agencies concerned with water resources should be able to contract with and make grants to any universities, whether or not they are the location of water research centers, in support of agency missions.

(b) It is desirable to develop additional centers of water resources research in many universities and to strengthen existing centers and programs.

(c) In order to accomplish (b), some Federal support to each such center on a continuing basis is necessary in addition to the support provided under (a). Responsibility for deciding how this supplementary support would be used should be left to the universities.

(d) Support to centers should be (1) in part on the basis of a relatively small formula amount to one or more designated research institutions in each State² to establish or strengthen their capacity for water resources research and (2) in part on a matching fund basis, giving consideration to the research potential of the institution.

² The Federal Council for Science and Technology qualified its acceptance of this recommendation, agreeing that at least one water resources research or analysis center could be established with Federal grants on a permissive basis in each State, under explicit qualification standards.

(e) New legislation should give to one agency the administrative responsibilities for carrying out (d)(1), without in any way superseding authorities presently vested in the several agencies.

(f) Similar authority is needed for (d)(2). The administrative responsibility should be vested in one agency which should seek appropriations for this purpose, but the grants should be made in consultation with the other agencies having substantive interests in the field of water resources, which should participate in the drawing up of rules and regulations and criteria for evaluation. Such consultation and coordination as are necessary could be accomplished through the proposed coordinating committee on water resources research.

(g) All agencies concerned with water resources should be able to make arrangements with educational institutions to permit Government scientists and engineers to teach and engage in water resources research at those institutions.

S. 2 contains the two types of support of water resources research centers recommended in items (c) and (d) of the report, and provides for the consultation recommended.

The bill does not provide for coordination of water resources research programs of the various Federal agencies. The executive branch properly intends to accomplish coordination through the Council for Science and Technology.

S. 2 does not attempt to broaden authorities of Federal departments or agencies beyond the jurisdiction of the committee to contract with universities for research in support of their missions, nor with the recommendation in item (g). It would be inappropriate to deal with matters beyond the proper purview of the Interior and Insular Affairs Committee. Members of the committee, however, are in accord with those recommendations as a result of the committee's study of water research problems.

The committee finds that S. 2 contains ample authority for the Secretary of the Interior to assure high standards of research at colleges and universities which participate in S. 2 programs. The institutes and centers must demonstrate their ability to conduct competent research, investigations, and experiments. The Secretary of the Interior is authorized and directed to prescribe rules and regulations as necessary to carry out the bill's provisions, including requirement of a showing that the agencies designated to receive section 100(a) funds have, or (if just starting) may reasonably be expected to have, capability of doing effective work.

The Secretary of the Interior will have full authority to approve or disapprove specific research projects proposed for matching, grant, and contract support under sections 100(b) and 200.

The committee does not feel that there should be unnecessary Federal interference in the basic operation of State institutes or centers. Overdone, it can straitjacket water research in the centers across the Nation under a single, central set of concepts when a variety of approaches and the genius of many minds could better be allowed expression.

Colleges and universities have widely demonstrated their great ability to administer research programs and to link them fruitfully with teaching.

The pattern of the agricultural experiment station program, a cooperative Federal-State venture, has created such outstanding results that the wisdom of leaving to the colleges and universities decisions on conduct of their basic programs would be extremely difficult to question.

The committee reemphasizes that S. 2 has not and is not presented as a total Federal water resources research program, and reiterates the statement of the author when he presented it. He said:

The proposal is not a solution to all water resources research problems. It will make a great contribution both to the assurance of adequate water supplies and the advancement of our scientific knowledge but there will be a continuing necessity for special Federal water research programs such as the present saline water and pollution control work. There will be need for intensified fundamental scientific research into the nature of this element, and into every aspect of the hydrologic cycle, not only in the colleges and universities, but wherever competent scientists can be enlisted and supported in the work.

This bill proposes what I believe will become a very important part of the sort of national water research program called for by the Senate Select Committee on National Water Resources in its 1961 report, but only one part of it.

SECTION BY SECTION ANALYSIS OF S. 2

Section 1 declares the policy and purpose of Congress to assure an abundance of water, both in quantity and quality, and to help achieve this end, to stimulate research, investigations, and experimentation in the field, and to encourage the training of needed scientists through assistance to colleges and universities.

TITLE I

Section 100(a) authorizes payment of a sum, starting at \$75,000 and increasing to \$100,000 annually, to a land-grant college, State university, or other institution of higher education in each State to establish a water resources research institute, or center, to do competent research, investigations, or experiments in the broad field of water and related resources, cautioning against undue displacement of scientists and engineers elsewhere engaged in water resources research.

Section 100(b) authorizes an additional \$1 million appropriation increasing \$1 million annually to \$5 million in fiscal year 1968 and thereafter, to match, on a dollar-for-dollar basis, funds made available to the State institutes or centers for water research projects.

Section 101 makes provision for payment of the sums to institutions designated by the States, for reports on disbursements, and for recovery of any funds improperly diminished, lost, or misapplied.

Section 102 authorizes use of funds appropriated under the act for printing and disseminating results of research, retirement of employees, administration, purchase and rental of land, and provision of buildings. It also authorizes two or more resources institutes or agencies to plan and conduct research projects cooperatively and authorizes two or more States to designate a single interstate or regional institute or center.

Section 103 extends the mailing privilege of Federal agencies to the official mailings by the research centers or institutes.

Section 104 charges the Secretary of the Interior with responsibility for the administration of programs under the act, issuance of necessary rules and regulations, and advising and assisting the State water resources research agencies in their work. He is also to advise and assist the State agencies in coordinating their efforts, indicate lines of research that seem to him important, and assist in maintenance of cooperation between the State research centers, and between the State centers and Federal establishments. The Secretary is directed to determine the eligibility of each State to receive funds under section 100(a) by July 1 each year, and to make an annual report to Congress on the receipts, expenditures, and work of the agencies in all States.

Section 105 provides that nothing in the act shall modify or impair the legal relations between any of the colleges or universities and their States and authorizes the States to direct the division of section 100(a) funds to which the State is entitled between two or more institutions. It provides further that if two or more States designate a single interstate or regional center, the funds to which each State is entitled under section 100(a) shall be paid to the agency designated.

TITLE II

Title II establishes a second grant, matching, and contract fund through which financial assistance may be provided to any educational institutions, private foundations, private firms or individuals, or with local, State, and Federal agencies to undertake research in water resources problems on which work is deemed desirable and which are not otherwise being studied.

Section 200 authorizes appropriation of \$5 million to the Secretary of the Interior in 1964, increasing \$1 million a year for 5 years and continuing at \$10 million annually thereafter, for the purpose of making the grants, contracts, matching, or other arrangement for water resources research. The allocation of these funds is not restricted to the centers or institutes established under title I, but are made available to assure that any center of competence which can contribute to the Nation's needed water resources research work has an opportunity to do so within the dollar limits of the program.

TITLE III—MISCELLANEOUS PROVISIONS

Section 300 directs the Secretary of the Interior to arrange for the regular advice and cooperation of all agencies of the Federal Government concerned with water problems, and of State and local governments and private institutions to the end that work conducted under the act does not duplicate established water research programs; that it stimulates work in neglected fields and contributes to a comprehensive, nationwide program of water and related resources research. He is directed to disseminate reports and information on activities under the act and to maintain a broad catalog of Federal water resource research projects and investigations in progress or scheduled, together with such non-Federal projects as are voluntarily reported to him.

This cataloging function may be transferred elsewhere by the President as he determines desirable. The maintenance of the catalog is in no sense intended to carry with it any coordinating function or power and it is made transferrable by the President so that if, in the process of arranging for coordination of water resources research activities of the Federal agencies through the Council for Science and Technology, or otherwise, the President finds it desirable to locate the catalog outside the Department of the Interior it may be done. The committee, however, feels that establishment of such a publicly available catalog, permitting various water research centers to determine what others are doing so they may exchange information avoid duplication and strengthen the total national program, should not be delayed.

Section 301 provides that nothing in the act is to be construed as giving the Secretary of the Interior authority over water research in any other agency of the Federal Government or to alter in any way the existing water research authorities of other Federal agencies.

Section 302 authorizes establishment of a Water Resources Service in the Department of the Interior to administer programs authorized in the act.

Section 303 authorizes allocation of not more than 4 percent of funds appropriated under the act for administration, the employment of a Director of the Water Resources Service at grade 18 and, if necessary to obtain employees with the scientific knowledge and skills required, to employ not to exceed five employees above civil service grade 15 in addition to the number otherwise authorized by law.

Section 304 authorizes the Secretary of the Interior, when necessary and desirable, to make advance payments for the undertaking of water resources research work.

Section 305 provides that after 5 years of operation, the Secretary of the Interior shall make a comprehensive review and appraisal of progress and accomplishments under the act and submit it to Congress together with his recommendations and the independent views and recommendations of governing authorities of the State colleges and universities.

Section 306 authorizes use of the title "Water Resources Research Act."

Reports of the executive agencies on S. 2 follow:

DEPARTMENT OF THE INTERIOR,
OFFICE OF THE SECRETARY,
Washington, D.C., February 18, 1963.

HON. CLINTON P. ANDERSON,
Chairman, Committee on Interior and Insular Affairs,
U.S. Senate, Washington, D.C.

DEAR SENATOR ANDERSON: This responds to your request for the views of this Department on S. 2, a bill to establish water resources research centers at land-grant colleges and State universities, to stimulate water research at other colleges, universities, and centers of competence, and to promote a more adequate national program of water research.

We strongly recommend the enactment of this legislation.

Our views on this subject were set forth at some length in our report of January 3, 1963, on S. 3579, a similar bill introduced in the 87th Congress. We refer you to that report for a more detailed elaboration

on the reasons why we feel the enactment of the proposed legislation will make a major contribution toward promoting basic and applied research and investigations of a multidisciplinary character in those areas not now adequately covered under existing programs, augmenting the critically inadequate numbers of experts broadly experienced in the sciences related to water resources, assisting in the assembly and coordination of information on existing and needed research areas, and stimulating non-Federal competent and participation in the solution of water resources problems. We note that a number of changes which were recommended in S. 3579 have been incorporated in S. 2, and we believe that the amendments strengthen and improve the legislation.

It is axiomatic that the availability of adequate supplies of good quality water affects all of man's pursuits. Yet our current use of water is more than 300 billion gallons per day and projections indicate that within two decades the demand may double and will continue to rise in the years that follow. These competing demands for water for its many purposes will render even more critical the need for wise decisions as to its allocation and use. The correctness of these choices in turn will depend, in large measure, on the availability and quality of our knowledge about water in its many aspects. S. 2 will promote the acquisition of this knowledge by supplementing existing Federal and State activities in the field of water research and investigation.

The Bureau of the Budget has advised that there is no objection to the presentation of this report from the standpoint of the administration's program.

Sincerely yours,

STEWART L. UDALL,
Secretary of the Interior

DEPARTMENT OF THE INTERIOR,
OFFICE OF THE SECRETARY,
Washington, D.C., January 3, 1963.

HON. CLINTON P. ANDERSON,
Chairman, Committee on Interior and Insular Affairs,
U.S. Senate, Washington, D.C.

DEAR SENATOR ANDERSON: This responds to your request for the views of this Department on S. 3579, a bill to establish water resources research institutes at land-grant colleges and State universities and to promote a more adequate national program of water research.

We strongly recommend enactment of this legislation, and suggest certain technical amendments for the consideration of the committee.

The purpose of the bill is well stated in its title. Title I of S. 3579 authorizes the Secretary of the Interior to provide financial assistance to States and Puerto Rico in the amount of \$75,000 a year increasing to \$100,000 after 1966 for the purpose of establishing a collegewide or universitywide water resources research institute at a land-grant college or other equivalent university within the State. Each institute would have the responsibility to plan and conduct a broad program of basic or applied research relating to water resources, taking into consideration the needs of the respective State, water research projects being conducted by Federal agencies, and agricultural research projects being conducted by agricultural research stations. In addition, title I authorizes appropriations to the Secretary of the

Interior in the amount of \$1 million the first year, increasing to \$5 million annually the fifth year and thereafter, for grants to the institutes for the necessary expenses of water resources research projects. At least 50 percent of the cost of projects would be financed from funds furnished by the States or other sources.

Title II of the legislation authorizes the Secretary of the Interior to establish a Water Resources Service to administer programs authorized in the act; to encourage Federal cooperation in water problems research; to foster and develop a balanced, nationwide program of water and related resources research and action; to maintain for general use a catalog of water resources research investigation projects by Federal agencies and by non-Federal agencies on a voluntary basis; and generally to make available information on the research work conducted under the authority of the act. In addition, section 201 of title II authorizes the appropriation to the Secretary of the Interior of \$5 million the first year, increasing \$1 million annually for 5 years, for water problems research grants to schools, private foundations, other firms and individuals, and local, State, and Federal agencies, including the State water resources research institutes.

Enactment of the proposed legislation would make a major contribution toward the solution of four problems relating to the Nation's water policy: (1) It would promote the carrying out of urgently needed research work in all areas relating to water resources, particularly with respect to integrating and relating the economic, legal, social, engineering, recreation, biological, geographic, ecological, and other aspects of water problems; (2) it would provide a greatly needed opportunity for the training of scientific personnel for water matters; (3) it would provide a mechanism to assist in the coordination of Federal research efforts and the collation of information on water problems; and (4) it would strengthen non-Federal participation in planning and carrying out water resources conservation and development programs.

Central to the significance of the legislation is the establishment of the water resources research institutes at State universities or land-grant colleges. In this connection, the report of the Senate Select Committee on National Water Resources, in urging the substantial increase and expansion of water resources research activities, stated:

"Note should be made of one problem that shows up when expansion of research programs is considered; namely, the limited availability of competent research scientists. In recent years, fields such as electronics, aeronautics, astronautics, and nuclear energy have been glamorized and supported financially to the point where they are attracting many of the Nation's best research brains. Research in water has received much less public attention. The committee hopes that strengthening of water research programs as discussed herein would help to increase interest in this field. In the near future, additional steps may be necessary to see that our colleges and universities expand their training facilities, and get increasing numbers of competent people to select this field in order that additional research can be carried out" (S. Rept. 29, 87th Cong., 1st sess., p. 62).

The key importance of utilizing institutions of higher education for both enlarging our knowledge through research and training scientists and engineers is attested by a distinguished series of authorities. Notable among them is the President's Science Advisory Committee's

1960 Report of the Panel on Basic Research and Graduate Education under the chairmanship of Dr. Glenn T. Seaborg, then chancellor of the University of California at Berkeley and now Chairman of the Atomic Energy Commission.

The Panel stated:

"The central proposition of this report is that science and the making of scientists go best together. This means that when it can be managed, basic research should be done in, or at least in association with, universities. Exceptions to this rule are numerous, of course. Some problems, by their nature, require attack in ways that are not suited to university life; and the work of the geological survey, for example, can hardly be divided among the universities, yet it requires science of high quality, and basic research is essential to the whole undertaking; the same thing is true of many other enterprises of government and industry. Yet we hold to the view that in the absence of special considerations the university is the best place for basic research, and we note that separate installations which do the best work are, as a rule, those which have a close and effective connection with academic centers; the geological survey, in its intimate relation to academic geology, is an excellent case in point."

Prof. Abel Wolman, Chairman of the Water Resources Study of the National Academy of Sciences-National Research Council, found that:

"The most critical shortage in the field of water resources by far is the very real shortage of broadly trained people capable of planning and executing effective research programs. At present, we have no institutional structure in the United States to take care of multidisciplinary research in water. The whole hydrosciences field is now pathetically limited for the tasks involved. To strengthen it will require immediate provision of a program to enlist and train new people in a great many of the disciplines relating to water resources. The ultimate objective should be the development of a new structure and a new generation of well-rounded water scientists ready and able to approach the Nation's multidisciplinary water-resources problems in a unified manner as 'hydrosciences'."

The Committee on Natural Resources of the National Academy of Sciences-National Research Council came to the conclusion that:

"In adapting their research programs and activities to the requirements of the problems outlined in this report, governmental and non-governmental agencies and institutions should take full advantage of the resources of the universities, contracting out especially those studies for which the universities are uniquely equipped. It should be remembered that an important byproduct of the university research is the training that accompanies it, and the Committee reemphasizes the need for training research workers to deal effectively with the problems relating to natural resources. These problems require closer cooperation between natural and social scientists."

Thus, enactment of S. 3579 would have the two beneficial results of enlisting the scientific and engineering competence of university research in water resources problem-solving, and also of augmenting the critically inadequate numbers of scientists and engineers trained in the sciences related to water resources.

The proposed legislation would build on and utilize the established facilities of the State colleges and universities, thereby taking advantage of a system of educational institutions that for over a century has

demonstrated its effectiveness in disseminating and advancing knowledge widely throughout the Nation. Concurrently, the proposed legislation also would enable State universities to strengthen their participation in the sciences of natural resources management. These are persuasive reasons for establishment of broadly based water resources research centers at State universities. At the same time, the long-established activities and concern with agricultural water problems of the agricultural experiment stations should be maintained and developed.

Confidence in the success of this arrangement is enhanced by the State universities' recognition of and readiness to accept the obligations and the opportunities of participation in water resources research activities. At its November 13, 1962, annual meeting, the Association of State Universities and Land-Grant Colleges, composed of 64 such institutions in the 50 States, endorsed and supported the principles that are embodied in S. 3579.

This confirms the desirability of provisions of the bill which leave the decision to establish water resources research centers to the universities themselves as they may be authorized by their State legislatures. Implicit in the bill, furthermore, is an obligation to provide a substantial amount of non-Federal financing for any State water resources research institute. This assures that such centers will be established in response to valid needs recognized by the States in which they are located.

The broad concept of the nature of water resources research explicit in the proposed legislation is of key importance. As defined in S. 3579, such research comprehends the horizon of physical and social sciences and engineering. From our own experience in the Interior Department, we are well aware that the disciplines of economics as well as hydrology, of ecology as well as geology, of law as well as physics are essential elements in developing the knowledge required for dealing with complex water resources problems. It is especially because interdisciplinary research is essential for water resource problems that universities can develop the needed approaches. At universities, the faculties of engineering, agriculture, natural sciences, economic and social sciences, and law can jointly attack the many-faceted research problems.

For like reasons, it is desirable that, in addition to the land-grant colleges and State universities, other universities and research institutions, many of which have already exhibited a high degree of competence in water resources research, also be aided in water resources research. Title II of S. 3579 adequately meets this objective and makes it possible to enlist competence wherever it exists. The provisions of title II, in fact, make possible assistance in the development of high levels of competence where that is the objective of particular institutions. It should be noted with respect to title I of the bill, that its provisions are applicable to State universities and comparable institutions as well as to land-grant colleges.

Current review of ongoing and projected water resources research of the Federal agencies indicates that assistance to university research such as is contemplated by S. 3579 may be of interest to other Federal agencies as well as to the Department of the Interior. It would be the purpose of this Department to consult closely with other Federal agencies to the end that full consideration will be given to their views and recommendations relative to university research proposals.

Thus, until their needs are otherwise provided, university research that other Federal agencies indicate they expect to be of value in the discharge of their assigned responsibilities would be supported to the same extent as proposals related to the missions of this Department. It should be recognized also that enactment of S. 3579 would not in any way preclude or limit assistance to university research, including research by the Institutes, by other Federal agencies under whatever authorities they now have or may secure subsequently.

Another important benefit that will accrue from the authorization for assistance to water resources research at State universities is the encouragement of centers in each State where State and local officials and others concerned in State, local, and regional water resource problems can secure research assistance and information especially pertinent to their particular problem. This will be a major factor in strengthening non-Federal participation in planning and carrying out water resources conservation and development work.

In regard to the detailed provisions of the bill, there are several amendments and comments we suggest to the committee for consideration. First, we feel it would be desirable to make some minor changes in section 100 to afford the States greater flexibility in determining the organizational form and location of the proposed water resources research institutes. Along this line, we suggest that the term "center" be substituted for the more confining word "institute," and that the centers be described as those which are "multidisciplinary in character" rather than "universitywide or collegewide", as this will permit drawing on the contributions of more than one institution in appropriate cases. We also suggest that the bill be so drafted as to permit the State to participate in a regional center serving more than one State if it so desired.

We suggest that the provisions of section 106 for reports and recommendations by the Secretary of the Interior on progress and accomplishments should be made applicable to title II as well as to title I. To this end, we recommend amendment of section 106 on page 8, line 7, by striking the words "title I" and inserting in lieu there "this act." Because such amendment would make the provisions of that section generally applicable to the act, it would be appropriate to move the present section 106 to become a new section 303, and to renumber the remaining section accordingly.

The Senate Select Committee on National Water Resources pointed out that improved coordination of Federal water research programs is probably of equal importance with increasing Federal efforts in the most promising fields of research. Some of the provisions of sections 200 and 202 of S. 3579 deal with this urgent but difficult problem by assigning certain responsibilities to the Secretary of the Interior. We, of course, stand ready to make whatever contribution we can. It must be recognized, however, that successful coordination cannot be accomplished through the efforts of one department alone, but can be brought about only through the wholehearted cooperation of all affected Federal agencies acting under the central direction of the President and his office and working through productive Government-wide coordinating machinery.

In considering what might be the appropriate role of this Department under the act in the field of coordination, the distinction between staff and executive functions should be kept in mind. The most

important aspect of overall Federal coordination is the determination of the character and content of the research programs and allocation among the Federal agencies of responsibility for performance of the several component parts. This is the executive direction of the program and it is the responsibility of the President; in discharge of this responsibility the President is assisted by the Director, Office of Science and Technology, as provided in the Reorganization Plan No. 2 of 1962.

There is wide agreement that certain additional staff services are required for effective coordination. These include: (a) The compilation and dissemination of information about the findings and conclusions of research—a function which has been seriously neglected, as emphasized in recent hearings before the Senate Committee on Government Operations; (b) the current cataloging of ongoing research so that there is readily available knowledge of what is being investigated by whom; and (c) the analysis of research activities in relation to research needs by a full-time professional staff of the highest caliber; that is, ascertaining what are the significant problems whose solution requires research. These three elements of coordination, although related to the President's Executive direction of the program, are different in character, inasmuch as they are staff rather than Executive functions.

Provisions of S. 3579 would authorize organizational arrangements and funding for the three above-described staff activities. They are essential for effective progress of water resources research and there is wide agreement on the need for their performance. The December 21, 1962, letter from Dr. Jerome B. Wiesner, Director, OST, to Senator Anderson states that: "Mechanisms now exist in the Executive Office of the President for assuring necessary coordination of the type contemplated in section 200, which would place coordination responsibilities in a water resources service of the Department of the Interior." Dr. Wiesner's letter describes the measures being considered to accomplish these purposes. The committee may, therefore, wish to amend section 200 in the light of that advice and of the effectuation of Reorganization Plan No. 2 of 1962. Our main concern is to see that these staffing functions are adequately provided for, and we feel that satisfactory staffing assignments can be worked out after consultation among the parties concerned.

An additional item that warrants attention is assurance that the authorizing legislation permits continuance of support of research activities beyond the single 12-month period of an annual appropriation. Most worthwhile research needs to extend over several years so as to afford adequate opportunity to pursue promising leads. Serious research often will not be undertaken by qualified scientists and engineers unless there is reasonable expectation of multiyear support. It is equally true that universities cannot be expected to provide laboratories or other facilities except on the basis of a continuing program. In order to dispel any uncertainty on this score, we recommend that title II be amended by inserting on page 9, line 2, after the word "years," the following: "and to continue at the rate of \$10 million annually thereafter."

The provisions in the act authorizing Federal financial assistance to private research projects raise the question of protecting the public interest in any patents which might be developed as a result of such research. Three recently enacted statutes authorizing the Department to contract for research in the fields of coal, saline water, and helium require that patents and other results of Government-financed research be available to the general public royalty free. A similar provision would appear to be appropriate for inclusion in the bill.

While the Virgin Islands, Guam, and American Samoa are not eligible for assistance under title I, we hope that in years to come the fledgling institutions of higher learning in these territories will develop to the point where they would be qualified to assume the responsibility for establishing water resources research institute, and the necessary legislative amendments can be made at that time. Meanwhile, we note that appropriate entities in the territories would be eligible to receive research project assistance under section 201.

Enclosed is our 5-year estimate of personnel and other costs as required by the act of July 25, 1956 (5 U.S.C. 642a). In preparing these estimates, we have anticipated that the centralized administrative staff, although high in caliber, would be quite small in numbers. It also is our intention to rely heavily on an extensive series of highly competent consultants for guidance in selection of research proposals for assistance. This would bring to the Government the best guidance in the various scientific and engineering fields available outside of the Federal Government. In general, there is reason for confidence that the expenses of program administration can be held within the limitations of the bill, although we recognize that expenses such as those that fall in the cataloging and dissemination functions might in time develop to the point where the 4-percent limitation contained in section 300 might have to be increased.

In conclusion, in addition to enthusiastically urging enactment of S. 3579, we want also to concur fully in the view that it would be complementary to continued and enlarged research by Federal scientists employed in the several departments. Valuable as will be the advances in water resources knowledge that flow from the program contemplated by S. 3579, such "extramural" research in universities can in no sense substitute for the ongoing research of the agencies, including contract research that is an integral part of agency programs. Along with strengthening research at universities, we should concurrently strengthen in-house research of the Federal agencies. Certainly there are plenty of problems for both groups.

The Bureau of the Budget has advised that there is no objection to the presentation of this report from the standpoint of the administration's program.

Sincerely yours,

STEWART L. UDALL,
Secretary of the Interior.

S. 3579, A BILL TO ESTABLISH WATER RESOURCES RESEARCH INSTITUTES AT LAND-GRANT COLLEGES AND STATE UNIVERSITIES AND TO PROMOTE A MORE ADEQUATE NATIONAL PROGRAM OF WATER RESEARCH

Estimated additional man-years of civilian employment and expenditures for the first 5 years of proposed new program

	19cy	19cy+1	19cy+2	19cy+3	19cy+4p
Estimated additional man-years of civilian employment:					
Supervisory and professional.....	4.5	7	9	11	12
Clerical.....	8.0	13	18	22	25
Consultants (w.a.e.).....	¹ 2.0	¹ 3	¹ 4	¹ 5	¹ 6
Total, estimated additional man-years of civilian employment.....	14.5	23	31	38	43
Estimated additional expenditures:					
Personal services.....	\$165,000	\$265,000	\$355,000	\$425,000	\$475,000
All other.....	6,700,000	10,500,000	14,000,000	16,400,000	18,500,000
Total, estimated additional expenditures.....	6,865,000	10,765,000	14,355,000	16,825,000	18,975,000

¹ 1 man-year equivalent to 300 man-days.

EXECUTIVE OFFICE OF THE PRESIDENT,
OFFICE OF SCIENCE AND TECHNOLOGY,
Washington, D.C., January 1, 1963.

HON. CLINTON P. ANDERSON,
Chairman, Committee on Interior and Insular Affairs,
U.S. Senate, Washington, D.C.

DEAR SENATOR: I am pleased to respond to your request for my comments on S. 2 aimed at promoting a more adequate national program of water research.

In my letter to you of December 21, 1962, I commented extensively on its predecessors, S. 3579 introduced in the 87th Congress. A copy of that letter is attached since it states my views concerning the objectives and general character of the legislation needed to accomplish the purposes of that bill which are similar to those of S. 2. I am pleased to note that the revisions incorporated in the latter bill reflects favorable consideration of many of the points raised in my letter.

Based on our studies of the Federal programs and activities in water resources research, I am confident that S. 2 can contribute significantly to the strengthening of the capabilities of the colleges and universities to undertake broadly based research and analysis in the many disciplines bearing on water resources. I wish to reiterate, however, that the Government should adhere to high standards of quality in the administration of the program envisaged in S. 2. It would seem desirable to have specific language in the bill to this effect in order to make it clear to both the Government and the universities that this is the intent of the Congress.

Sincerely yours,

JEROME B. WIESNER.

FEDERAL POWER COMMISSION REPORT ON S. 2, 88TH CONGRESS

A bill to establish water resources research centers at land-grant colleges and State universities, to stimulate water research at other colleges, universities, and centers of competence, and to promote a more adequate national program of water research

This bill, if enacted, would be known as the Water Resources Research Act. Title I of the bill would authorize the establishment of a State water resources research institute or center at a land-grant college or university or other institution of higher education in each State for the purpose of conducting research in relation to water resources. In addition, the Secretary of the Interior would be authorized to match funds made available to such institutes or centers by the States or other sources to meet the expenses of specific water resources research projects. The proposed water resources institutes would be patterned after the agricultural experiment stations currently located at land-grant institutions.

Title II of the bill would authorize annual appropriations over a 5-year period to the Secretary of the Interior from which fund he would be empowered to make grants, contracts, matching, or other arrangements for research into water problems by educational institutions, private foundations, and other institutions, private firms, or individuals; and with local, State, and Federal Government agencies.

The administration of the various research programs authorized by the proposed enactment would be under a Water Resources Service to be set up by the Department of the Interior.

The bill makes specific mention of certain types of research which would be conducted, including the hydrological cycle, supply and demand for water, conservation and best use of available supplies, methods of increasing such supplies, economic, legal, social, engineering, recreation, biological, and other aspects of water problems.

The bill specifically states that the research programs authorized thereby are designed to supplement present programs and are not intended to supplant the work of various other public and private agencies engaged in water resources research. Section 301 expressly provides that the proposed legislation shall not be construed as giving the Secretary of the Interior "any authority or surveillance over water resources research conducted by any other agency of the Federal Government, nor shall it be construed as repealing, superseding, or diminishing existing authorities or responsibilities of any agency of the Federal Government to plan and conduct, contract for, or assist in research in its areas of responsibility and concern with water resources." In this connection, it also should be noted that the Secretary, in prescribing appropriate rules and regulations for administering the act, would be required to do so only "after full consultation with other Federal agencies."

It appears, therefore, to be the intent of this legislation that the work of the research institutes or centers and any other research programs which may be initiated under this proposal be closely related to and carried out coordinately in cooperation with the work of existing Federal agencies such as the Corps of Engineers, the Bureau of Reclamation, the Weather Bureau, Geological Survey, Public Health Services, Bureau of Outdoor Recreation, and the Office of Saline Water.

Pursuant to the provisions of the Federal Power Act, the Commission issues licenses to citizens, corporations, States, and municipalities authorizing the construction, operation, and maintenance of water-power projects on lands of the United States and on streams over which the Congress has jurisdiction. Closely related to the licensing activities are the Commission's responsibilities under the Flood Control and River and Harbor Acts to advise and make recommendations to the Federal constructing agencies on power matters. In both activities the Commission makes basinwide investigations and studies of the possible multiple-purpose uses of rivers and their tributaries. Thus, the Commission has an important interest in all phases of water resource development and in research related thereto. Any effective measures designed to further research in this field would be of value to the Commission.

The Commission therefore supports the purposes and objectives of this bill.

FEDERAL POWER COMMISSION,
(Signed) JOSEPH C. SWIDLER, *Chairman.*

EXECUTIVE OFFICE OF THE PRESIDENT,
BUREAU OF THE BUDGET,
Washington, D.C., February 15, 1963.

HON. CLINTON P. ANDERSON,
Chairman, Committee on Interior and Insular Affairs,
U.S. Senate, Washington, D.C.

DEAR MR. CHAIRMAN: This is in reply to your letter of January 24, 1963, requesting the comments of this office with respect to S. 2, to establish water resources research centers at land-grant colleges and State universities, to stimulate water research at other colleges, universities and centers of competence, and to promote a more adequate national program of water research.

Under title I of the bill, funds would be authorized for distribution by the Secretary of the Interior to land-grant or other State-designated institutions for the purpose of establishing water resources research institutes. Additional funds would also be authorized which the Secretary could use to match funds made available to the institutes by the States or by other sources.

Title II of the bill would authorize additional appropriations to the Secretary of the Interior from which he could make grants, contracts, or other arrangements with Government or private agencies and institutions. Title III contains certain miscellaneous provisions relating to the administration of programs under the bill, including authority for the Secretary of the Interior to establish in the Department a Water Resources Research Service.

We recently provided views on a predecessor bill, S. 3579, to your committee and also informally suggested alternative language on certain provisions of that bill to committee staff. It is noted that a number of our comments on S. 3579, as well as those of other agencies, were taken into account in the drafting of S. 2. Consequently, we are now commenting on only two aspects of the bill which pose difficulties.

There is no explicit statement in the bill that the Secretary of the Interior is to approve plans for and review research being conducted

under title I to assure its adequacy and conformance with the broad objectives of the bill. Section 101 contemplates that the Secretary is to be concerned with fiscal controls to assure that funds are not misapplied. Section 104 provides that the Secretary is to prescribe rules and regulations to carry out provisions of the bill and is to furnish assistance to research institutions. Because these actions do not provide adequate authority to the Secretary of the Interior in administering the program, we believe he should be authorized to set standards for research and to monitor adherence thereto. To that end, we would suggest that language such as the following be inserted at the end of section 100 of the bill: "The Secretary shall approve proposals for and maintain a review of all research under this section to assure high standards of quality." In the interests of promoting strong research programs we would expect the Secretary of the Interior to encourage cooperative arrangements among State water research agencies, as envisioned under section 102, whenever appropriate. We recommend specific language to this effect be included in the bill.

Finally, we believe that provisions of title III with respect to establishment of a Water Resources Service within the Department of the Interior are unnecessary and undesirable. The Secretary of the Interior now has adequate reorganization authority to take future action if and when he so decides. Furthermore, in view of the general authorization provided in the Postal Service and Federal Employees Salary Act of 1962, special personnel provisions should not be required to staff new constituents of the Department.

Strengthening of university water research activities would constitute a major step toward meeting goals set forth by the President in the water resources area. The Bureau of the Budget advises that enactment of legislation along these lines would be in accord with the President's program.

Sincerely yours,

(Signed) Phillip S. Hughes,
PHILLIP S. HUGHES,
Assistant Director for Legislative Reference.

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE,
Washington, February 18, 1963.

HON. CLINTON P. ANDERSON,
Chairman, Committee on Interior and Insular Affairs,
U.S. Senate, Washington, D.C.

DEAR MR. CHAIRMAN: This letter is in response to your request of January 24, 1963, for a report on S. 2, the proposed Water Resources Research Act.

We are wholly in sympathy with the bill's basic objective to promote a more adequate national program of water research. However, for the reasons summarized below, we question the need for title I of the bill, and we are not wholly in accord with the provisions of title III.

The provisions of title II of the bill—authorizing appropriations to the Department of the Interior to be used for grants, contracts, or matching or other arrangements for conducting research into aspects of water problems related to its mission (not defined in the bill)—are desirable and in accord with existing accepted methods for pro-

ductive Federal research participation. They provide for the widest possible participation by scientists in research on water resources matters, permit all institutions, public and private, and all disciplines to participate, and can be administered to supply stable support for programs in universities and yet obtain flexibility in research approach. And they would give to the Secretary of the Interior research and research-support authority comparable to that which is vested in this Department under the Water Pollution Control Act in order to promote good-quality water adequate for all legitimate uses.

If title II is enacted and similar authorization is provided, as it should be for all other Federal water resources agencies that now lack such authority, there is, in our opinion, little, if any, need for the proposed title I programs under which grants would be made by the Secretary of the Interior for the establishment and support of a water resources institute or center at a land-grant college or other State-designated educational institution in each State (including Puerto Rico). However, if title I is retained, some modifications are indicated. In the first place, the complete spectrum of water resources aspects specified as subjects for desirable research and investigations to be conducted by the proposed water research agencies is necessarily of basic interest to all Federal water resources agencies. We would therefore suggest participation by other Federal departments in the formulation of the rules and regulations necessary to carry out these provisions, with the Secretary of the Interior promulgating them. Secondly, we recommend deletion of the provision of section 104 that would require the Secretary of the Interior to encourage and assist in the establishment and maintenance of cooperation between the State research agencies and Federal establishments. We have encountered no difficulties in this regard in the administration of our research programs and, from the standpoint of this Department, do not perceive any need for an intermediary agent as proposed.

Finally, if the provision for a central water research and investigations catalog is retained in the bill (instead of leaving this matter to administrative discretion), we recommend that the function of establishing and maintaining such a coordinating device, on the basis of reports from Federal and other agencies and organizations, be vested in the Office of Science and Technology—which already has responsibilities for review and coordination of major Federal activities in scientific research—instead of deferring its transfer, as provided in the bill, to the time when, if ever, a central catalog is established for all scientific research.

If the bill is modified as above suggested, we would have no objection to its enactment.

The Bureau of the Budget advises that, while there is no objection to the submission of this report, the enactment of legislation along the lines of S. 2 would be in accord with the program of the President.

Sincerely,

ANTHONY J. CELEBREZZE, *Secretary*.

DEPARTMENT OF THE ARMY,
Washington, D.C.

HON. CLINTON P. ANDERSON,
Chairman, Committee on Interior and Insular Affairs,
U.S. Senate.

DEAR MR. CHAIRMAN: Reference is made to your request to the Secretary of Defense for views of the Department of Defense with respect to S. 2, 88th Congress, a bill to establish water resources research centers at land-grant colleges and State universities, to stimulate water research at other colleges, universities and centers of competence, and to promote a more adequate national program of water research. The Department of the Army has been assigned responsibility for expressing the views of the Department of Defense on this bill.

Title I of the bill would authorize appropriation of \$75,000 annually, increasing to \$100,000 in the third year, to each of the States to help finance a collegewide or universitywide water resources research institute or center. There would be authorized appropriation of an additional \$1 million, increasing to \$5 million in the fifth year, which the Secretary of the Interior would be authorized to use to match State or other non-Federal funds for specific water research projects at these institutes or centers.

Title II of the bill would authorize to be appropriated to the Secretary of the Interior \$5 million, increasing to \$10 million in the fifth year and annually thereafter, from which he would make grants or enter into contracts or make matching or other arrangements with educational institutions, private entities, or governmental agencies for research into water problems related to the Interior Department mission.

Title III would authorize the Secretary of the Interior to establish in the Department of the Interior a water resources service for the purpose of administering programs authorized in the bill. Section 301 states that nothing in the bill is intended nor shall be construed as giving the Secretary of the Interior any authority or surveillance over water resources research conducted by any other agency of the Federal Government.

The Department of the Army believes that an expansion of State research in the water field, supplementing and complementing the water research of the Federal agencies, would be desirable. Moreover, it is believed that an increase in the grants which the Federal Government now makes to the States to encourage research would be justified by the benefits which would accrue to the Nation as a whole. Hence, the basic objective of S. 2 has the full support of the Department of the Army, on behalf of the Department of Defense.

The attention of the committee is invited to the fact that the National Science Foundation has broad authority for making grants for basic research. In addition, as you are aware, the Office of Experiment Stations in the Department of Agriculture already has organizational facilities through which Federal grants-in-aid of research are being made annually to land-grant institutions. Other important grants to the States for water research are made by the Public Health Service in the Department of Health, Education, and Welfare. In view of the existence of such agencies, we question the need for establishment of still another agency to administer such

programs. Accordingly, the Department believes that they could most appropriately be administered by the National Science Foundation.

The attention of the committee is invited to the fact that the Federal Council for Science and Technology's Task Group on Water Resources Research, on which all of the water resources agencies were represented, has made a careful study of the need for legislation to strengthen the field of water resources research through providing authority for multidisciplinary program grants, extramural research grants, and education and training. Prior to completing its consideration of this bill, it is suggested that the committee should have the benefit of the report of the task group. This Department understands that the report will include a recommendation that a water resources committee be established under the Federal Council for Science and Technology; that committee would be assigned the responsibility for coordinating the planning and programming of Federal in-house and extramural programs of water resources research.

This report has been coordinated within the Department of Defense in accordance with procedures prescribed by the Secretary of Defense.

The Bureau of the Budget advises that the enactment of legislation along the lines of S. 2 would be in accord with the program of the President.

Sincerely yours,

(Signed) CYRUS R. VANCE,
Secretary of the Army.

DEPARTMENT OF AGRICULTURE,
Washington, D.C., February 19, 1963.

HON. CLINTON P. ANDERSON,
Chairman, Committee on Interior and Insular Affairs,
U.S. Senate.

DEAR MR. CHAIRMAN: Thank you for your letter of January 24, 1963, giving us the opportunity to report on Senate bill 2. The bill is entitled "To establish water resources research centers at land-grant colleges and State universities, to stimulate water research at other colleges, universities, and centers of competence, and to promote a more adequate national program of water research."

We support the purposes of S. 2, as it would stimulate water resources research in colleges and universities, thereby strengthening the overall research in this significant field and at the same time helping train new scientists and engineers that are much needed for research and teaching in this field.

Title I of S. 2 authorizes an appropriation of \$75,000, increasing to \$100,000 in the third year, to each of the States to help finance a collegewide or universitywide water resources research institute, center, or equivalent agency. It further authorizes an appropriation of an additional \$1 million, increasing to \$5 million in the fifth year, which the Secretary of the Interior may use to match State or other non-Federal source funds for specific water resource projects.

Title II of S. 2 authorizes an appropriation of \$5 million, increasing to \$10 million in the fifth year, which the Secretary of the Interior may use for grants, contracts, matching or other arrangements with educa-

tional institutions, private foundations, or other institutions; private firms and individuals; local, State, and Federal Government agencies to undertake research into any aspects of water problems related to the mission of the Department of the Interior which may be deemed desirable and would not otherwise be studied.

Title III contains certain miscellaneous provisions related to the administration of programs under the bill.

The magnitude of public and private programs to make efficient and effective use of the Nation's soil and water resources is well known.

The U.S. Senate, through its exhaustive "Report of the Select Committee on National Water Resources," has made the public increasingly aware of the Nation's water problems—problems which make it incumbent upon the research agencies to make new advancements in their solutions.

The Department of Agriculture is concerned that the proposed bill covers only a part of the total coordinated program of scientific research on water as requested by the Senate Select Committee on National Water Resources.

The Department of Agriculture has outlined a comprehensive program of basic and applied research on the production, development, management, and use of water on crop, forest, and rangeland watersheds. In its proposed program the Department would direct its studies toward obtaining a better understanding of the basic relationships between the quantity, quality, and management of water and the development and use of other resources of crop, forest, and rangelands. Research is now and in the future would be aimed at economic and institutional problems of water use, improving water yields from our forested watersheds and rangelands, increasing efficiency in the agricultural use of water, and protection of our soil resources from uncontrolled water. Such a program would be substantially as outlined in committee print No. 28, Senate Select Committee on National Water Resources entitled "Water Resources Research Needs."

Agriculture's tremendous responsibility in the effective use of water is evident when we consider some of the data on water use and management. The average annual precipitation for the conterminous United States is 4.75 billion acre-feet. The first impact of this primary water supply is on the surface of the land. The nature of vegetative cover, slope, soil characteristics, cropping patterns, and conservation practices exert the first determination whether precipitation becomes surface runoff, deep percolation, or soil moisture for evapotranspiration. The lion's share of this total water supply—3.38 billion acre-feet—presently is used by evapotranspiration from vegetative lands. The remaining 1.37 billion acre-feet constitute the massed water supply available to the Nation. Irrigation agriculture is dependent on this supply and accounts for 90 percent of the water that is consumptively used.

How land in farms and forest, and rangeland not in farms, are managed has a tremendous impact on the potential yield and use of water. In fact, water, soil, and vegetation are so closely related that they cannot be managed separately. Thus, it has been logical and necessary for the U.S. Department of Agriculture to develop programs of soil and water research and watershed management over the past 50 or 60 years. The close association in the U.S. Department of Agriculture between research and action in land and water use is of

great importance. Each serves the other. Action programs in the U.S. Department of Agriculture dealing with more than three-fourths of the land area in the United States are principal users and often the first to use research results. They provide practical tests for research and point the way to new investigations. Also, research is often directed to specific management problems.

This partnership of research and management in the U.S. Department of Agriculture has produced an understanding of the close association of soil, water, and vegetation resources. The long background of experience and interest has established in the Department a capability acquired through a long tradition of scientific research. This has enabled it to make the major contribution to progress in the entire field of soil and water conservation research. The Department of Agriculture's long history of effective cooperative and coordinated work with the program of the land-grant colleges as established under the Morrill Act of 1862, including cooperative work carried out under the Hatch Act of 1887, further establishes its position of leadership in conducting the type of effort proposed in title I of the bill. The proposed administrative arrangements in title I would unavoidably complicate this relationship and generate new problems of research coordination at the State level.

We construe the language of section 100(a) to render eligible the State agricultural experiment stations as qualified for designation, at the option of the land-grant college, as a water resources research institute, center, or equivalent agency.

Title II of the bill we wholeheartedly support, but recommend that it be broadened to include the Secretary of Agriculture and the mission of the Department of Agriculture so that the established technical competence in each of the Departments will strengthen the total needed effort in water resources research. The Department of Agriculture currently has very limited authority for research grants other than the Hatch Act as amended.

This Department is seriously concerned about some of the provisions contained in title III of the bill. We question whether it is the most effective form of organization to authorize one of the departments participating in water research to exercise a coordinating role in relation to the activities of other departments. We suggest that this coordinating role might more properly be exercised by the Executive Office of the President. These comments apply particularly to section 300.

The Bureau of the Budget advises that enactment of legislation along the lines of S. 2 would be in accord with the program of the President.

Sincerely yours,

ORVILLE L. FREEMAN, *Secretary*.

THE SECRETARY OF COMMERCE,
Washington, D.C., February 19, 1963.

HON. CLINTON P. ANDERSON,
*Chairman, Committee on Interior and Insular Affairs,
U.S. Senate, Washington, D.C.*

DEAR MR. CHAIRMAN: This letter is in reply to your request for the views of this Department with respect to S. 2, a bill to establish water resources research centers at land-grant colleges, and State universities, to stimulate water research at other colleges, universities, and centers of competence, and to promote a more adequate national program of water research.

The bill would authorize grants of \$75,000 annually (to be increased eventually to \$100,000 annually) to land-grant or other institutions designated in each State for the financing of water-research institutes therein. The bill would also authorize appropriations of \$1 million for fiscal year 1964, and greater amounts in succeeding years for grants to be matched by the States and used to finance water resources research projects at such institutes. Finally, the bill would authorize appropriations of \$5 million for fiscal year 1964, which would increase annually by \$1 million for 5 years to be used for any aspects of water research related to the mission of the Department of the Interior.

The Department of Commerce believes that increased emphasis should be placed on water resources and related research, and we are, therefore, in favor of the objectives of S. 2.

We feel that the establishment of 50 or more separate research institutes might result in duplication of effort and consequently in some inefficiency. Although there may be a need for a geographically dispersed program in some research fields such as agriculture, the needs of water resources research programs are quite different. Therefore, the same degree of dispersal for water research is not necessarily justified by the satisfactory experience under agricultural research programs. This objection might be met by establishing only a limited number of water-research institutes by States cooperatively on a regional basis.

The Bureau of the Budget advises that enactment of legislation along the lines of S. 2 would be in accord with the program of the President.

Sincerely yours,

C. D. MARTIN, Jr.,
Acting Secretary of Commerce.

○

88TH CONGRESS
1ST SESSION

S. 2

[Report No. 117]

IN THE SENATE OF THE UNITED STATES

JANUARY 14 (legislative day, JANUARY 9), 1963

Mr. ANDERSON (for himself, Mr. JACKSON, Mr. KUCHEL, Mr. METCALF, Mr. McGOVERN, Mr. HART, Mr. GRUENING, Mr. BURDICK, Mr. MCGEE, Mr. MORSE, Mr. ENGLE, Mr. MOSS, Mr. CARLSON, Mr. MANSFIELD, Mr. YARBOROUGH, Mr. LONG of Missouri, Mr. BAYH, Mr. HRUSKA, Mr. BARTLETT, Mr. MCINTYRE, Mr. FONG, Mr. BREWSTER, and Mr. BIBLE) introduced the following bill; which was read twice and referred to the Committee on Interior and Insular Affairs

APRIL 8, 1963

Reported by Mr. ANDERSON, without amendment.

A BILL

To establish water resources research centers at land-grant colleges and States universities, to stimulate water research at other colleges, universities and centers of competence, and to promote a more adequate national program of water research.

1 *Be it enacted by the Senate and House of Representa-*
2 *tives of the United States of America in Congress assembled,*
3 That it is the policy and purpose of the Congress to assure
4 the Nation at all times an abundance of water, both as to
5 quantities and quality, necessary to meet the requirements
6 of its expanding population, and, to help achieve this objec-

1 tive, to stimulate, sponsor, and provide for the conduct of
2 research, investigations, and experiments in the field of water
3 and related resources as they affect water, supplementing
4 present programs, and to encourage the training of scientists
5 in fields related to water by assistance to colleges and univer-
6 sities in the development of water resources research
7 programs.

8 TITLE I—STATE WATER RESOURCES RESEARCH
9 INSTITUTES OR CENTERS

10 SEC. 100. (a) There is authorized to be appropriated,
11 for the fiscal year 1964 and subsequent years, for distribu-
12 tion to a college or university in each State and Puerto Rico,
13 established in accordance with an Act approved July 2,
14 1862 (12 Stat. 503), entitled “An Act donating public
15 lands to the several States and territories which may provide
16 colleges for the benefit of agriculture and the mechanic arts”,
17 or such other institutions of higher education as any State
18 shall determine, a sum adequate to provide \$75,000 to each
19 State in the first year, to be increased by \$12,500 each
20 succeeding fiscal year for two years and to continue at
21 \$100,000 thereafter, for the purpose of establishing a college-
22 wide or universitywide water resources research institute,
23 center, or equivalent agency. It shall be the duty of each
24 such institute or center to plan and conduct and/or arrange
25 for a component or components of its college or university

1 to conduct competent researches, investigations, or experi-
2 ments, of either a basic or practical nature, or both, in re-
3 lation to water resources, including but not limited to aspects
4 of the hydrological cycle, supply and demand for water,
5 conservation and best use of available supplies, methods of
6 increasing such supplies, economic, legal, social, engineering,
7 recreation, biological, geographic, ecological, and other
8 aspects of water problems, as may in each case be deemed
9 advisable, having due regard to the varying conditions and
10 needs of the respective States and Puerto Rico, to water
11 research projects being conducted by agencies of the Federal
12 Government, and to those related to agriculture being con-
13 ducted by the agricultural experiment stations, and also hav-
14 ing regard to avoidance of any undue displacement of scien-
15 tists and engineers elsewhere engaged in water resources
16 research.

17 (b) There is further authorized to be appropriated to
18 the Secretary of the Interior in the fiscal year 1964 the sum
19 of \$1,000,000, increasing by \$1,000,000 each year for four
20 years to \$5,000,000 in fiscal year 1968 and thereafter, which
21 the Secretary of the Interior may use to match, on a dollar
22 for dollar basis, funds made available to State water re-
23 sources research institutes or centers by the States or other
24 non-Federal sources, to meet the necessary expenses of water
25 resources research projects which could not otherwise be

1 undertaken, including the expense of planning and coordinat-
2 ing regional water resources research projects by two or
3 more State water research agencies.

4 SEC. 101. Sums available to the States under the terms
5 of section 100 (a) of this Act shall be paid to the designated
6 institution or institutions in each State in equal quarterly
7 payments beginning on the first day of July of each fiscal
8 year upon vouchers approved by the Secretary of the
9 Interior. Each such agency authorized to receive funds
10 shall have an officer appointed by its governing authority
11 who shall receive and account for all funds paid to the State
12 under the provisions of this Act and shall make an annual
13 report to the Secretary of the Interior, on or before the first
14 day of September of each year, on work accomplished and
15 the status of projects underway together with a detailed
16 statement of the amount received under any of the provisions
17 of this Act during the preceding fiscal year, and of its dis-
18 bursement, on schedules prescribed by the Secretary of the
19 Interior. If any of the moneys received by the authorized
20 receiving officer of any State water resources research agency
21 under the provisions of this Act shall by any action or con-
22 tingency be found by the Secretary of the Interior to have
23 them improperly diminished, lost, or misapplied, it shall be
24 replaced by the State concerned and until so replaced no
25 subsequent appropriation shall be allotted or paid to such

1 States. Pending a meeting of the legislature of any State,
2 the Secretary of the Interior shall pay sums appropriated
3 pursuant to section 100 of this Act to a qualified institution
4 designated by the Governor of such State.

5 SEC. 102. Moneys appropriated pursuant to this Act
6 shall also be available, in addition to meeting expenses for
7 research and investigations conducted under authority of this
8 Act, for printing and disseminating the results of such re-
9 search, retirement of employees subject to the applicable pro-
10 visions of the Act approved March 4, 1940 (54 Stat. 39),
11 administrative planning and direction, and for the purchase
12 and rental of land and the construction, acquisition, altera-
13 tion, or repair of buildings necessary for conducting research.
14 The State water resources research agencies are authorized
15 to plan and conduct any research authorized under this Act
16 in cooperation with each other and such other agencies and
17 individuals as may contribute to the solution of the water
18 problems involved, and moneys appropriated pursuant to this
19 Act shall be available for paying the necessary expenses of
20 planning, coordinating, and conducting such cooperative re-
21 search. Two or more States may cooperate in the designa-
22 tion of a single interstate or regional research institute or
23 center.

24 SEC. 103. Bulletins, reports, periodicals, reprints of

1 articles, and other publications necessary for the dissemina-
2 tion of results of the researches and experiments, including
3 lists of publications available for distribution by the institu-
4 tions, shall be transmitted in the mails of the United States
5 under penalty indicia: *Provided, however,* That each publi-
6 cation shall bear such indicia as are prescribed by the Post-
7 master General and shall be mailed under such regulations as
8 the Postmaster General may from time to time prescribe.
9 Such publications may be mailed from the principal place
10 of business of the institute or center, or from an established
11 subunit of such agency.

12 SEC. 104. The Secretary of the Interior is hereby
13 charged with the responsibility for the proper administra-
14 tion of this Act, and, after full consultation with other Fed-
15 eral agencies, is authorized and directed to prescribe such
16 rules and regulations as may be necessary to carry out its
17 provisions, including requirement of a showing that agencies
18 designated to receive funds have, or may reasonably be
19 expected to have, the capability of doing effective work. It
20 shall be the duty of the Secretary to furnish such advice and
21 assistance as will best promote the purposes of this Act,
22 including participation in coordination of research initiated
23 under this Act by the State water resources research agen-
24 cies, from time to time, to indicate such lines of inquiry as
25 to him seem most important, and to encourage and assist

1 in the establishment and maintenance of cooperation by and
2 between the several State water resources research agencies
3 and between the State agencies and the United States
4 Department of the Interior and other Federal establishments.

5 On or before the 1st day of July in each year after the
6 passage of this Act, the Secretary of the Interior shall ascer-
7 tain as to each State whether it is entitled to receive its share
8 of the annual appropriations for water resources research
9 under section 100 (a) of this Act and the amount which
10 thereupon each is entitled, respectively, to receive.

11 The Secretary of the Interior shall make an annual
12 report to the Congress of the receipts and expenditures and
13 work of the water resources research agencies in all States
14 under the provisions of this Act and also whether any portion
15 of the appropriation available for allotment to any State has
16 been withheld and if so the reasons therefor.

17 SEC. 105. Nothing in this Act shall be construed to im-
18 pair or modify the legal relation existing between any of
19 the colleges or universities under whose direction State water
20 resources research institutes or centers are established and
21 the government of the States in which they are respectively
22 located: *Provided*, That in any State which designates more
23 than one such college or university to have a water resources
24 research center the appropriations made pursuant to section
25 100 (a) of this Act for such State shall be divided between

1 such institutions as the legislature of such State shall direct:
2 *Provided further*, That in any instance where two or more
3 States designate a single interstate or regional institute or
4 center, the funds of each of the States under section 100 (a)
5 may, upon the direction of the States, be paid to the desig-
6 nated agency.

7 TITLE II—ADDITIONAL WATER RESOURCES
8 RESEARCH PROGRAMS

9 SEC. 200. There is authorized to be appropriated to the
10 Secretary of the Interior \$5,000,000 in fiscal year 1964,
11 increasing \$1,000,000, annually for five years, and continu-
12 ing at \$10,000,000 annually thereafter from which he may
13 make grants, contracts, matching, or other arrangements
14 with educational institutions, private foundations, or other
15 institutions; with private firms and individuals; and with
16 local, State, or Federal Government agencies, to undertake
17 research into any aspects of water problems related to the
18 mission of the Department of the Interior, which may be
19 deemed desirable and are not otherwise being studied.

20 TITLE III—MISCELLANEOUS PROVISIONS

21 SEC. 300. The Secretary of the Interior shall arrange
22 for the regular advice and cooperation of all agencies of the
23 Federal Government concerned with water problems, of State
24 and local governments and of private institutions and
25 individuals, to assure that the programs authorized in this

1 Act will supplement and not duplicate established water
2 research programs, to stimulate research in otherwise neg-
3 lected areas, and to contribute to a comprehensive, nation-
4 wide program of water and related resources research. He
5 shall make generally available information and reports on
6 projects completed, in progress, or planned under the
7 provisions of this Act, in addition to any direct dissemination
8 of information by the research agencies themselves. Each
9 Federal agency doing water resources research or inves-
10 tigations shall advise the Secretary of the Interior at least
11 once annually of work underway or scheduled by it. The
12 Secretary of the Interior shall classify and maintain for
13 general use a catalog of water resources research and in-
14 vestigation projects in progress or scheduled by Federal
15 agencies, and by such non-Federal agencies of government,
16 colleges, universities, private institutions, firms and in-
17 dividuals as may make voluntarily available information to
18 him: *Provided*, That upon the establishment of a central
19 or general system of cataloging current and projected scien-
20 tific research in all fields encompassing the cataloging func-
21 tion herein authorized, the President may transfer this
22 function as he determines to be desirable.

23 SEC. 301. Nothing in the foregoing section nor in this
24 Act is intended nor shall be construed as giving its Secretary
25 or the Department of the Interior any authority or surveil-

1 lance over water resources research conducted by any other
2 agency of the Federal Government, nor shall it be construed
3 as repealing, superseding, or diminishing existing authorities
4 or responsibilities of any agency of the Federal Government
5 to plan and conduct, contract for, or assist in research in its
6 areas of responsibility and concern with water resources.

7 SEC. 302. The Secretary of the Interior is authorized
8 to establish in the Department of the Interior a Water
9 Resources Service for the purpose of administering programs
10 authorized in this Act.

11 SEC. 303. Not to exceed 4 per centum of any funds
12 appropriated pursuant to the provisions of this Act may be
13 used for the purpose of administration. The Secretary of
14 the Interior is authorized to employ a director of the Water
15 Resources Service at civil service grade 18 and, if necessary
16 to obtain personnel competent to administer a program in-
17 volving scientific knowledge and highly trained staffs, he
18 may employ not to exceed five employees above civil service
19 grade 15 in addition to the number otherwise authorized by
20 law.

21 SEC. 304. Contracts or other arrangements for water
22 resources research work authorized under this Act may be
23 undertaken without regard to the provisions of section 3684
24 of the Revised Statutes (31 U.S.C. 529) when in the

1 judgment of the Secretary of the Interior such payments
2 are necessary to facilitate such research.

3 SEC. 305. Within not more than a year following the
4 fifth year of operation of this Act, the Secretary of the
5 Interior shall prepare and submit to the President for
6 transmittal to the Senate and House of Representatives
7 a comprehensive report on progress and accomplishments
8 under the Act, together with his recommendations on re-
9 visions of the Act, and with the independent recommenda-
10 tions of the governing authorities of the State colleges and
11 universities on desirable revisions. This section is not in-
12 tended to preclude any interim recommendations deemed
13 desirable.

14 SEC. 306. This Act may be known as the "Water Re-
15 sources Research Act."

88TH CONGRESS
1ST SESSION

S. 2

[Report No. 117]

A BILL

To establish water resources research centers at land-grant colleges and State universities, to stimulate water research at other colleges, universities, and centers of competence, and to promote a more adequate national program of water research.

By Mr. ANDERSON, Mr. JACKSON, Mr. KUCHEL, Mr. METCALF, Mr. MCGOVERN, Mr. HART, Mr. GREENING, Mr. BURDICK, Mr. MCGEE, Mr. MORSE, Mr. ENGLE, Mr. MOSS, Mr. CARLSON, Mr. MANSFIELD, Mr. YARBOROUGH, Mr. LONG of Missouri, Mr. BAYH, Mr. HRUSKA, Mr. BARTLETT, Mr. MCINTYRE, Mr. FONG, Mr. BREWSTER, and Mr. BIBLE

JANUARY 14 (legislative day, JANUARY 9, 1963)

Read twice and referred to the Committee on Interior
and Insular Affairs

APRIL 8, 1963

Reported without amendment

Digest of CONGRESSIONAL PROCEEDINGS

OF INTEREST TO THE DEPARTMENT OF AGRICULTURE

OFFICE OF
BUDGET AND FINANCE

(For information only;
should not be quoted
or cited)

Issued April 12, 1963
For actions of April 11, 1963
88th-1st, No. 54

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HIGHLIGHTS: House Rules Committee cleared feed grain bill. Senate passed bill for transfer of cotton allotments in disaster areas. Sen. Morse urged stronger actions to gain entry of U. S. agricultural products in Common Market. Both Houses received President's proposal to establish National Service Corps. Rep. Dowdy opposed wheat referendum and discussed its effect on the other producers.

HOUSE

1. FEED GRAINS. The Rules Committee reported a resolution for consideration of H. R. 4997, to extend the feed grain program. p. 6047
2. WHEAT; LIVESTOCK. Rep. Dowdy recommended against passage of the wheat referendum and its effects upon other commodities. pp. 6035-6
3. APPROPRIATIONS. Rep. Cannon explained the status of the current appropriation bills and compared the supplemental appropriation bill not passed in the last session of Congress with the one recently passed. pp. 6036-9

4. FOREIGN AFFAIRS. Rep. Oliver Bolton criticized USDA's press release stating that "the failures of Soviet agriculture were due to bad weather alone" in 1962. pp. 6040-1
5. NATIONAL PARKS. Rep. Ichord urged establishment of the Ozark National Rivers area as a national park. pp. 6014-5
6. GOVERNMENT CONTROLS. Rep. Kyl criticized increased Government controls over the farmers, especially noting the wheat referendum. p. 6016
7. EXPENDITURES. Rep. Foreman criticized the level of Government spending. pp. 6016-7
8. TAXATION. Rep. Jennings inserted a speech by Treasury Under Secretary Fowler explaining the advantages of the President's tax reduction program. pp. 6045-6
9. LEGISLATIVE PROGRAM. Rep. Albert announced that on Mon., Apr. 22, the Consent and Private Calendars will be called; on Wed., Apr. 24, the House will take up H. R. 4997, to extend the feed grains program, and on Thurs. and the balance of the week, H. R. 1762, outdoor recreation. Rep. Albert also stated that the Appropriations Committee desires to bring up the Labor-HEW bill on Apr. 29. pp. 6030-1
10. ADJOURNED until Mon., Apr. 22. p. 6046

SENATE

11. COTTON. Passed without amendment H. R. 5067, to extend to the 1963 cotton crop the authority to permit farmers with flooded-out cotton acreage to transfer their cotton allotments to another farm in the same or an adjoining county operated by the same farmer. This bill will now be sent to the President. p. 6081
12. FOREIGN TRADE. Sen. Morse criticized European Common Market restrictions on the importation of U. S. agricultural products and urged the administration to take stronger actions in negotiating for the entry of our agricultural products into Common Market countries. pp. 6136-8
13. DAIRY INDUSTRY. Sen. Sparkman referred to "complaints received from independent dairy processors about unfair, discriminatory, and predatory competitive practices in connection with the sale of milk and milk products," and inserted a statement by a Federal Trade Commission official reviewing actions taken by the Commission to prevent mergers in the dairy industry. pp. 6112-3
14. WATER RESOURCES. S. 2, to provide for the establishment of water resources research centers at land-grant colleges and State universities, was made the unfinished business of the Senate, with debate to begin Mon., Apr. 22. p. 6114
Sen. Anderson inserted an address by the former director of the Calif. Department of Water Resources presenting "a perceptive and thoughtful discussion of Federal-State water rights issues and of the potentialities of S. 1111 in helping to resolve such conflicts and facilitate river basin planning." pp. 6104-8
15. NATIONAL SERVICE CORPS. Both Houses received from the President a proposed bill "to provide for a National Service Corps to strengthen community service programs in the United States"; to H. Education and Labor and S. Labor and Public Welfare Committees. pp. 6047, 6082

7597; and the Great Atlantic and Pacific Tea Co., Inc., docket No. 7598.

In some of these cases hearings are in progress and some have been decided. Some orders have been entered by the hearing examiners and some by the Commission. In summary, the Commission has issued a substantial number of formal antimonopoly complaints involving your industry. The complaints name as respondents national concerns as well as regional dairies, chain-stores, and producers. Many of the complaints are national in scope but some primarily involve regional markets. The practices involved include, but are not limited to, territorial and competing customer, price discriminations, disproportionate advertising allowances, conspiracy to fix prices, exclusive dealing, selling below cost, and illegal acquisitions and mergers.

These cases have brought to light many serious interpretation and evidentiary problems which must be solved before effective Commission action can be felt in these areas. At the threshold of any action we are met with a series of objections directed toward what I believe is an unrealistically narrow interpretation of what is interstate commerce, a basic prerequisite of any Commission action. However, the seriousness of these objections cannot be ignored. A recent decision of the Sixth U.S. Circuit Court of Appeals, *Willard Dairy v. National Dairy Products Corp.*, 1962 Trade Cases, par. 70,586 (Sixth Cir. 1962), raises some serious questions but, in and of itself, does not represent an unsurmountable obstacle to our efforts to curb the activities of the interstate giants who are discriminating in local markets.

Then we always have the problem of "who struck John." In several of the cases in which our trials have been completed we have been unable to affix responsibility for the price break that triggered the war. Somewhere lurking in the wings is the jug-operator or the discounter who, for his own purposes, is insistent upon depressing the price sometimes until it reaches below cost proportions. Somehow in this maze of statistics, claims and counterclaims the majors sometimes emerge smelling like the proverbial rose.

This is not to say that these proven obstacles will deter us in our efforts but I would be less than candid if I did not recognize the seriousness of our problems, indeed your problems, if we are to render any effective aid to the small dairy processor.

But all is not grim.

Sometimes our efforts result in definite contributions to clarification of the status of industry practices as well as to the type and style of remedy which may emerge to eliminate the practices. Consider our recent Borden decision, (docket 7129), in which the Commission prohibited discrimination in price between identical products even though they were different brands. And I should note that a cease and desist order can have broad implications. Although the discrimination was limited to evaporated milk, the Commission's order encompassed all "food products." The Commission took the position that the same or similar price discrimination practice could be used as well for other food products and the order, to be effective, was made to include all food products.

Recently the Commission has demonstrated an increased awareness of the inequities which arise from piecemeal action directed against individual companies who are engaged in industrywide practices.

If competitors are free to ignore Commission regulation, any individual company operating under a cease-and-desist order operates at a serious disadvantage. Accordingly, we intend to proceed against all offenders and even the smaller members of the dairy industry if their conduct warrants such action. In fact, some of our investigations

have disclosed that in some instances small, independent companies have initiated practices which have touched off price wars.

C. INVESTIGATIONS RELATING TO PRICING

Numerous complaints are received every week concerning pricing problems in the dairy industry by the Division of Discriminatory Practices. This division is responsible for the trial of cases involving violations of sections 2 and 3 of the Clayton Act, and cases brought under section 5 of the Federal Trade Commission Act against buyers for knowingly inducing and receiving discriminatory allowances from suppliers.

The staff located in Washington, with the assistance of the field office personnel, has expended a substantial number of man-hours devoted to investigations involving discriminatory pricing in the sale of fluid milk. Over 27 such cases are presently under investigation, excluding numerous and time-consuming investigational hearings.

The cases involve allegations of sales below cost, territorial price discriminations, and discriminations among competing customers. The investigations cover most of the Nation including market areas located in the States of Arizona, Arkansas, California, Colorado, Illinois, Indiana, Kansas, Massachusetts, Michigan, Minnesota, Missouri, Nebraska, New Jersey, New Mexico, New York, Ohio, Pennsylvania, Rhode Island, South Carolina, Tennessee, Texas, Utah, West Virginia, and Wisconsin.

The Commission is very much aware of the problems in this industry and authorized a broad, nationwide investigation in its resolution, dated July 3, 1962. The resolution stating the Commission's reasons for initiating the investigation reads:

"Whereas the Commission has received complaints and information to the effect that some corporations may be engaged in unfair and discriminatory acts and practices in connection with the production, distribution, purchase and sale of fluid milk alone or in combination with other products or services in Indianapolis, Ind.; Denver, Colo.; St. Louis, Mo.; Topeka, Kans.; Peoria, Ill., and other trade areas throughout the United States; and

"Whereas, instances have come to the attention of the Commission where some corporations have engaged in the practice of selling fluid milk alone or in combination with other products or services in selected market areas at below cost prices; and further have engaged in the practice of selling fluid milk alone or in combination with other products or services in certain selected geographical areas at extremely low prices while maintaining much higher prices in other areas; * * *

"Whereas the Commission has received complaints and information to the effect that such acts and practices result in severe economic injury to many small businesses; and

"Whereas such acts and practices may constitute violations of section 2 of the Clayton Act, as amended by the Robinson-Patman Act (15 U.S.C. 13), or section 5 of the Federal Trade Commission Act (15 U.S.C. 45), statutes administered by the Commission, or may require additional legislation. * * *

Investigational hearings have been held pursuant to the Commission's resolution in Indianapolis, Chicago, Denver, Detroit, Dayton, and Long Island. These records are presently being reviewed with a view of determining whether complaints should issue. The Commission is making a concentrated effort to stop the demise of small business concerns because of unlawful pricing practices.

But decisions to proceed by the complaint process are not easily made. We are very much aware of the problems which have arisen in past cases and the difficulties of proof which I have already mentioned. But we are not fainthearted. And I am proud

of the fact that many of the criticisms of the Commission in the recent past have been directed toward an excess of zeal in its efforts to secure compliance with the statutes which it enforces rather than the negative harpings that the Commission is not making all-out efforts to enforce the law.

I must say, however, that all does not come out roses with regard to the complaints filed by this association. We have found in many of our investigations that the assistance that we receive from industry members is inadequate.

They are not completely informed as to the chronology of events that have taken place in the market. They have not saved advertisements showing price changes and have not documented injury such as loss of customers; sales volume or profits. These are some of the reasons why investigations are time consuming.

In many instances our investigations have disclosed that the pricing practices complained of are purely local and entirely intrastate. Formal complaints cannot issue in these circumstances because of jurisdictional limitations. Much time and effort would be saved if members of the industry would be more selective in making complaints. In these cases, the complaints should be called to the attention of State regulatory agencies. Competitive pricing is the jugular vein controlling your very existence. Direct your complaints to all who can or will help whether they be on the community, city, county, State or Federal level.

It must be noticed that once complaint is issued, there are many dilatory tactics that can be and are utilized to delay litigation. However, we must remember that all persons charged with violations of laws administered by the Commission are entitled to a fair trial. Yet complaints are numerous concerning the pace at which litigated cases proceed. It is felt that the recent revision in the rules requiring continuous hearings will help speed up litigation. Authority to issue temporary cease and desist orders, if granted to the Commission, would be of inestimable help to the Commission in halting unlawful practices prior to termination of protracted proceedings.

Although the dairy industry is only a small part of the total economy with which the Commission is concerned, the record of formal complaints issued and investigations undertaken demonstrates the vigilance of the Commission in its efforts to insure the continued existence of this industry comprised of small, independent entrepreneurs such as yourselves.

Thank you for the privilege of discussing these important matters with you.

THE CHANGING ROLE OF WOMEN IN A CHANGING SOCIETY

Mr. MOSS. Mr. President, the Deseret News, one of Utah's outstanding newspapers, recently published a series of feature articles on "The Changing Role of Women in a Changing Society—6 Months Later," which was the subject of a seminar held recently at the University of Utah.

A featured speaker at this seminar was Mrs. George A. Ballif, member of the Education Committee of the President's Commission on the Status of Women, and one of Utah's most prominent and distinguished women. This Commission is to make its report to the President next October and I commend the Deseret News article to my colleagues and ask unanimous consent that it be printed in the Record at this point.

There being no objection, the article was ordered to be printed in the RECORD, as follows:

MODERN WOMAN TOLD: ACCEPT INTELLECTUAL CHALLENGES

(By Rose Mary Pedersen)

For today's woman, studying philosophy may be more important than baking a cake.

Or, to put it a bit differently, a woman is making a serious mistake if she allows surface things to take precedence over basics.

(And the most important basic of all is education.)

This was the contention of Mrs. George A. Ballif, member of the President's Commission on the Status of Women, and featured speaker at a symposium held last week at the University of Utah.

INTELLECTUAL STIMULATION

Mrs. Ballif, lecturing at the conference on "The Changing Role of Women—6 Months Later," emphasized that every woman—be she young or old—needs a generous amount of intellectual stimulation in her life.

"If women are to fulfill their promise as individuals, as well as bring the best they can of themselves to their families, they must keep studying," the University of Utah seminar speaker stated.

"With all the New Frontier emphasis on culture, women now, more than ever, need to become better informed individuals. One of the tragedies of our 20th century is that woman brainpower has been allowed to go virtually untapped."

Explaining this point of view, Mrs. Ballif said that being a member of the President's Commission on the Status of Women has put her in direct contact with facts and figures concerning women in the professional world.

"It has been shocking and disheartening to discover that although more girls are going to college now than ever before, fewer are putting their college educations to work for them."

She continued that although our Nation's colleges and universities are turning out vast numbers of well-qualified, scholarly young ladies who show promise in a variety of academic directions, few of those graduates are doing much with what they have learned.

SCAN STATISTICS

According to Mrs. Ballif, a mere scanning of the statistics shows few young women interested in anything but suburban housewifery.

"And there is absolutely no excuse for this," chided the seminar speaker. "Girls have great intellectual potentialities. And they must not, because of social pressure (or lackadaisical attitudes) neglect to develop them."

Referring back to this idea, the symposium speaker remarked that society must not allow its women to become apathetical, or to fall prey to defeatist so-what-does-it-matter points of view.

"This way of thinking will sow seeds of national destruction," Mrs. Ballif warned.

Using as her reference the newly published book, "The Feminine Mystique," by Betty Friedan, Mrs. Ballif said many American women are suffering a "slow deterioration of mind and spirit" because the pattern into which the have been told they must fit does not inspire them at all; require mature capabilities or the stretching of mental muscles.

FRUSTRATED WOMEN

In other words, in Mrs. Ballif's opinion, American women today are becoming frustrated because they feel there should be something more for them in life than dusting, doing dishes, and making peanut butter sandwiches.

Is anything being done to alter this condition?

Mrs. Ballif remarked that the President's Commission currently is involved in studies to make the lot of women brighter and more intellectually challenging.

"We have people on our committee investigating the possibilities of sending women back to school even during their childbearing years; we have groups looking into the possibilities of providing better jobs with better pay for women; we have people examining statistics about the older women and analyzing how a more rewarding life for her might be found after her family is grown and gone."

Mrs. Ballif told those in attendance at the U. of U. conference that these studies (they began under the direction of the "very well-educated" Mrs. Eleanor Roosevelt) have pointed up again and again that there is nothing more fundamental to a society than the opportunity to learn.

GOLDEN OPPORTUNITY

Without this opportunity, Mrs. Ballif said, "human beings feel stifled, futile and have no real reason for going on from one day to another."

She stressed quietly but intently, "Women, as well as men, have the inherent right to be considered as human beings—as human beings entitled to the opportunity to learn."

And again quoting Betty Friedan, she said: "If we continue to produce millions of young mothers who stop their education, short of identity, we are contributing to the mass burial of the American woman."

ESTABLISHMENT OF WATER RESOURCES RESEARCH CENTERS

Mr. MANSFIELD. Mr. President, at the present time on the calendar are three bills still to be considered. There are three bills only. One is the bill (S. 2), to establish water resources research centers at land-grant colleges and State universities.

I ask unanimous consent that the bill S. 2 be laid before the Senate and made the pending business.

The PRESIDING OFFICER. The bill will be stated by title.

The LEGISLATIVE CLERK. A bill (S. 2) to establish water resources research centers at land-grant colleges, and State universities, to stimulate water research at other colleges, universities, and centers of competence, and to promote a more adequate national program of water research.

The PRESIDING OFFICER. Is there objection to the request of the Senator from Montana?

There being no objection, the Senate proceeded to consider the bill.

Mr. MANSFIELD. Mr. President, there will be no action taken on that bill today.

ORDER FOR ADJOURNMENT UNTIL 12 O'CLOCK MONDAY, APRIL 15, THEN TO 12 O'CLOCK THURSDAY, APRIL 18, AND LEGISLATIVE PROGRAM

Mr. MANSFIELD. Mr. President, I ask unanimous consent that when the Senate adjourns tonight, it adjourn to meet at 12 o'clock on Monday next, and that following the adjournment on Monday next, the Senate adjourn to meet at 12 o'clock noon on Thursday next.

The PRESIDING OFFICER. Without objection, it is so ordered.

Mr. MANSFIELD. Mr. President, there will be no business on those 2 days. The meetings of the Senate will be pro forma. Any Senator who desires to make speeches may feel free to do so.

A week from Monday the bill (S. 2) to establish water resources research centers at land-grant colleges and State universities will be the pending business before the Senate. We intend to have the bill before the Senate on that day.

Consideration of that bill will be followed by consideration of Senate bill 1007, a bill to guarantee electric consumers in the Pacific Northwest first call on electric energy generated at Federal hydroelectric plants in that region and to guarantee electric consumers in other regions reciprocal priority, and for other purposes.

Consideration of that bill will be followed or taken up concurrently with consideration of the confirmation of the nominees for the directors of the Satellite Communications Corp.

CONGRESSIONAL BUSINESS

Mr. MANSFIELD. Mr. President, some of the country's newspapers, some of its political scientists, and some of its public officials have recently joined in a chorus of dismay over the failure of the Congress to get down to business. With a unanimity of opinion and even of phrase they have belabored the committee system of the Congress, the chairmen of the committees, the President, the party leadership in Congress, and something called the Senate establishment.

This kind of criticism has a way of snowballing, and I expect that other newspapers, political scientists, and officials will join in the criticism, perhaps even—as in past years—after the Congress has succeeded in passing a substantial legislative program. There is a certain lag in these matters.

Therefore, before we celebrate the Easter season, Mr. President, I think it would be wise to take stock of the past 3 months, and to assess the work of the 88th Congress as of April 11. This may give us a better judgment of the criticism that has been leveled at the Congress in recent weeks.

We began the session with a prolonged controversy over an amendment to the cloture rule. I shall not undertake to judge the merits of prolonging that debate to the extent it was. Nevertheless it did consume those weeks we usually devote to the organization of committees and the commencement of hearings on the President's program.

It required another 2 weeks after the rules fight had ended before we were able to complete committee assignments and provide funds for investigations and other committee activity.

Finally, the ordinary mechanics of the Senate were set in motion. Committees began their hearings and deliberations, and we received the first major bills of the Congress.

Since that time we have completed action on the following measures:

The Youth Employment Act—a 5-year program to employ and retrain jobless youngsters between the ages of 16 and

Digest of CONGRESSIONAL PROCEEDINGS

OF INTEREST TO THE DEPARTMENT OF AGRICULTURE

OFFICE OF
BUDGET AND FINANCE

(For information only;
should not be quoted
or cited)

Issued April 23, 1963
For actions of April 22, 1963
88th-1st, No. 57

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HIGHLIGHTS: Senate debated water resources research facilities bill. Sen. Morse expressed concern over trade restrictions on U. S. agricultural products. Rep. Curtis defended Republican efforts to reduce budget. Rep. Sullivan introduced and discussed food stamp bill.

SENATE

- 1. WATER RESEARCH.** Continued debate on S. 2, to provide for the establishment of water resources research centers at land-grant colleges and State universities (pp. 6331, 6339, 6347-59). Agreed to a unanimous-consent agreement to limit debate on each amendment to one hour beginning Tues., Apr. 23 (p. 6339).
Sens. Long (La.) and Yarborough submitted amendments intended to be proposed to this bill, S. 2. p. 6303
- 2. ELECTRIFICATION.** Began consideration of S. 1007, to guarantee electric consumers in the Pacific Northwest first call on electric energy generated at Federal hydro-electric plants in that region and to guarantee electric consumers in other regions reciprocal priority. pp. 6359-60

3. FOREIGN TRADE. Sen. Morse expressed concern over restrictions on the export of domestic farm commodities and inserted an article by the chief of the Agricultural Development Division of the Oregon Department of Agriculture, "Tariff and Trade Restriction Problems of Oregon Agriculture." pp. 6308-9
4. LUMBER IMPORTS. Sen. Morse stated that "Canada now has a new Government and I look forward to the possibility that there may be further discussions between our Governments" on the problem of Canadian lumber imports, and he inserted several items discussing this problem. pp. 6322-7
5. FARM LABOR. Sen. Williams (N. J.) supported enactment of legislation to provide additional Federal aid to migratory farm workers and inserted an article from Presbyterian Life discussing the migratory labor situation. pp. 6328-9
6. FORESTRY. Sen. Church inserted an article supporting enactment of the wilderness preservation bill. p. 6346
Sen. Moss submitted two amendments intended to be proposed to S. 27, to provide for the establishment of the Canyonlands National Park, Utah, which would include certain national-forest lands, and he inserted an editorial supporting enactment of this legislation. pp. 6303-4
7. TOBACCO. Sen. Moss discussed the "hazards of cigarette smoking," and inserted his letter to television networks and tobacco companies urging them to "take the glamour out of cigarette advertising." pp. 6327-8
8. NATIONAL SERVICE CORPS. Sen. Williams (N. J.) inserted an article favoring establishment of the proposed domestic National Service Corps and suggesting how the Corps could be used to assist migratory farm workers. pp. 6329-30
9. FOREIGN AID. Sen. Church reviewed the "astonishing pace" of Japanese economic development and suggested that U. S. foreign aid to Japan should be discontinued. pp. 6343-6
10. TRANSPORTATION. Both Houses received from the Department of the Air Force a proposed bill "to authorize the President to take possession and assume control of transportation systems in time of national emergency"; to H. Armed Services and S. Commerce Committees. pp. 6295-6300
11. DATA PROCESSING. Received from GAO a report on the review of selected automatic data processing facilities, National Bureau of Standards, Department of Commerce. pp. 6295, 6300
12. GRAZING LANDS. Both Houses received from Interior a proposed bill "to amend section 8 of the Taylor Grazing Act of June 28, 1934"; to H. and S. Interior and Insular Affairs Committees. pp. 6296, 6300
13. APPROPRIATIONS; CLAIMS. Received from the President a supplemental appropriation estimate of \$3,574,144 to pay claims and judgments rendered against the U. S. (S. Doc. 14). p. 6299

HOUSE

14. EXPENDITURES. Rep. Curtis spoke in favor of reducing Government expenditures. pp. 6276-9
Rep. Broyhill (N.C.) criticized "the continued growth in Federal Government employment" and inserted an article stating that "cuts in taxation cannot be made sensibly without cuts in Government spending." pp. 6279-80

S. 2

IN THE SENATE OF THE UNITED STATES

APRIL 18, 1963

Ordered to lie on the table and to be printed

AMENDMENT

Intended to be proposed by Mr. ALLOTT to S. 2, a bill to establish water resources research centers at land-grant colleges and State universities, to stimulate water research at other colleges, universities, and centers of competence, and to promote a more adequate national program of water research, viz:

- 1 On page 10, beginning at line 7, strike all through
- 2 line 20.

Amdt. No 49

AMENDMENT

Intended to be proposed by Mr. ALLOT to S. 2, a bill to establish water resources research centers at land-grant colleges and State universities, to stimulate water research at other colleges, universities, and centers of competence, and to promote a more adequate national program of water research.

APRIL 18, 1963

Ordered to lie on the table and to be printed

S. 2

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AMENDMENT

Intended to be proposed by Mr. ALLOTT to S. 2, a bill to establish water resources research centers at land-grant colleges and State universities, to stimulate water research at other colleges, universities, and centers of competence, and to promote a more adequate national program of water research, viz: On page 8, beginning at line 9, strike all through line 19 and insert in lieu thereof:

1 SEC. 200. There is authorized to be appropriated to the
2 Secretary of the Interior \$5,000,000 in fiscal year 1964,
3 and in each of four fiscal years thereafter, from which he
4 may make grants, contracts, matching, or other arrange-
5 ments with recipients such as educational institutions, private
6 foundations, or other institutions; with private firms and
7 individuals; and with local, State, or Federal Government
8 agencies, to undertake research into any aspects of water

- 1 problems indigenous to the area where such recipient is
2 located and not otherwise being studied.

Amdt. No. 50

Calendar No. 95

88TH CONGRESS
1ST SESSION

S. 2

AMENDMENT

Intended to be proposed by Mr. ALBERT to
S. 2, a bill to establish water resources
research centers at land-grant colleges and
State universities, to stimulate water re-
search at other colleges, universities, and
centers of competence, and to promote a
more adequate national program of water
research.

APRIL 18, 1963

Ordered to lie on the table and to be printed

IN THE SENATE OF THE UNITED STATES

APRIL 18, 1963

Ordered to lie on the table and to be printed

AMENDMENT

Intended to be proposed by Mr. ALLOTT to S. 2, a bill to establish water resources research centers at land-grant colleges and State universities, to stimulate water research at other colleges, universities, and centers of competence, and to promote a more adequate national program of water research, viz:

- 1 On page 3, beginning at line 19, strike all through line
- 2 20 and insert in lieu thereof: "of \$1,000,000, and for each
- 3 of four fiscal years thereafter, which".

Amdt. No. 51

AMENDMENT

Intended to be proposed by Mr. ALDORT to S. 2, a bill to establish water resources research centers at land-grant colleges and State universities, to stimulate water research at other colleges, universities, and centers of competence, and to promote a more adequate national program of water research.

APRIL 18, 1963

Ordered to lie on the table and to be printed

S. 2

IN THE SENATE OF THE UNITED STATES

APRIL 18, 1963

Ordered to lie on the table and to be printed

AMENDMENT

Intended to be proposed by Mr. ALLOTT to S. 2, a bill to establish water resources research centers at land-grant colleges and State universities, to stimulate water research at other colleges, universities, and centers of competence, and to promote a more adequate national program of water research, viz:

- 1 On page 2, line 21, following the figure "\$100,000"
- 2 add the following: "for each of two fiscal years".

★Amdt. No. 52

Amdt. No. 52

Calendar No. 95

**88TH CONGRESS
1ST SESSION**

S. 2

AMENDMENT

Intended to be proposed by Mr. ARNOTT to S. 2, a bill to establish water resources research centers at land-grant colleges and State universities, to stimulate water research at other colleges, universities, and centers of competence, and to promote a more adequate national program of water research.

APRIL 18, 1963

Ordered to lie on the table and to be printed

88TH CONGRESS
1ST SESSION

Calendar No. 95

S. 2

IN THE SENATE OF THE UNITED STATES

APRIL 18, 1963

Ordered to lie on the table and to be printed

AMENDMENT

Intended to be proposed by Mr. ALLOTT to S. 2, a bill to establish water resources research centers at land-grant colleges and State universities, to stimulate water research at other colleges, universities, and centers of competence, and to promote a more adequate national program of water research, viz: On page 11, beginning at line 3, strike all through line 13 and insert in lieu thereof:

1 SEC. 305. Within two years following enactment of this
2 Act, and annually thereafter, the Secretary of the Interior
3 shall prepare and submit to the President for transmittal to
4 the Senate and House of Representatives a comprehensive
5 report on progress and accomplishments under the Act, to-
6 gether with his recommendations on revisions of the Act, and
7 with the independent recommendations of the governing

- 1 authorities of the State colleges and universities on desirable
 2 revisions.

AMENDMENT

Intended to be proposed by Mr. ALLOTT to S. 2, a bill to establish water resources research centers at land-grant colleges and State universities, to stimulate water research at other colleges, universities, and centers of competence, and to promote a more adequate national program of water research.

APRIL 18, 1963

Ordered to lie on the table and to be printed

S. 2

IN THE SENATE OF THE UNITED STATES

APRIL 18, 1963

Ordered to lie on the table and to be printed

AMENDMENT

Intended to be proposed by Mr. ALLOTT to S. 2, a bill to establish water resources research centers at land-grant colleges and State universities, to stimulate water research at other colleges, universities, and centers of competence, and to promote a more adequate national program of water research, viz:

- 1 On page 3, line 9, after the word: "advisable", add the
- 2 following: "by the institute or center,".

Amdt. No. 54

AMENDMENT

Intended to be proposed by Mr. ARNOTT to S. 2, a bill to establish water resources research centers at land-grant colleges and State universities, to stimulate water research at other colleges, universities, and centers of competence, and to promote a more adequate national program of water research.

APRIL 18, 1963

Ordered to lie on the table and to be printed

Calendar No. 95

88TH CONGRESS
1ST SESSION

S. 2

IN THE SENATE OF THE UNITED STATES

APRIL 22, 1963

Ordered to lie on the table and to be printed

AMENDMENT

Intended to be proposed by Mr. YARBOROUGH to the bill (S. 2) to establish water resources research centers at land-grant colleges and State universities, to stimulate water research at other colleges, universities, and centers of competence, and to promote a more adequate national program of water research, viz: Beginning on page 5, strike all of section 103 and substitute in lieu thereof:

1 SEC. 103. (a) Paragraph (1) of section 4152 (a) of
2 title 39, United States Code, is amended by striking the word
3 “and” at the end of subparagraph (E) and by adding the fol-
4 lowing at the end of subparagraph (F) : “and
5 “(G) Any institute or center engaged in activities au-
6 thorized by the Water Resources Research Act consisting of
7 bulletins, reports, periodicals, reprints of articles, and other
8 publications necessary for the dissemination or results of re-

1 searches and experiments within the scope of the Act, as
2 determined by the Secretary of the Interior, mailed from the
3 principal place of business of the institute or center, or from
4 an established subunit of the same.”

5 (b) Section 4156 of title 39, United States Code, is
6 amended by adding a new subsection (d) as follows:

7 “(d) The Department of Interior shall transfer to the
8 Post Office Department as postal revenue out of any appro-
9 priation made to it for that purpose the equivalent amount of
10 postage, as determined by the Postmaster General, for
11 penalty mailings under section 4152 (a) (1) (G) of this
12 title.”

AMENDMENT

Intended to be proposed by Mr. YARBOROUGH to the bill (S. 2) to establish water resources research centers at land-grant colleges and State universities, to stimulate water research at other colleges, universities, and centers of competence, and to promote a more adequate national program of water research.

APRIL 22, 1963

Ordered to lie on the table and to be printed

88TH CONGRESS
1ST SESSION

S. 2

IN THE SENATE OF THE UNITED STATES

APRIL 22, 1963

Ordered to lie on the table and to be printed

AMENDMENTS

Intended to be proposed by Mr. LONG of Louisiana to the bill (S. 2) to establish water resources research centers at land-grant colleges and State universities, to stimulate water research at other colleges, universities, and centers of competence, and to promote a more adequate national program of water research, viz:

1 On page 11, between lines 2 and 3, insert the following
2 new section:

3 “SEC. 305. No part of any appropriated funds may be
4 expended pursuant to authorization given by this Act for
5 any scientific or technological research or development
6 activity unless such expenditure is conditioned upon pro-
7 visions determined by the Secretary of the Interior, with
8 the approval of the Attorney General, to be effective to
9 insure that all information, uses, products, processes, patents,

Amdt. No. 56

1 and other developments resulting from that activity will
2 (with such exceptions and limitations as the Secretary may
3 determine after consultation with the Secretary of Defense
4 to be necessary in the interest of the national defense) be
5 made freely and fully available to the general public.
6 Nothing contained in this subsection shall deprive the owner
7 of any background patent relating to any such activity of
8 any right which that owner may have under that patent.”

9 On page 11, line 3, strike out “SEC. 305”, and insert
10 in lieu thereof “SEC. 306”.

11 On page 11, line 14, strike out “SEC. 306”, and insert
12 in lieu thereof “SEC. 307”.

AMENDMENTS

Intended to be proposed by Mr. Long of Louisiana to the bill (S. 2) to establish water resources research centers at land-grant colleges and State universities, to stimulate water research at other colleges, universities, and centers of competence, and to promote a more adequate national program of water research.

APRIL 22, 1963

Ordered to lie on the table and to be printed

INCLUSION OF DISTRICT OF COLUMBIA TEMPORARY TEACHERS IN HEALTH AND LIFE INSURANCE PROGRAMS

Mr. MORSE. Mr. President, temporary teachers employed by the District of Columbia Board of Education cannot participate, as matters stand, in the Health and Life Insurance programs available to permanent employees. I am informed that the reason for this situation is that the U.S. Civil Service Commission, by regulation, has excluded all employees in a temporary category.

I am informed that there is a high percentage of teachers employed by the Board of Education who are considered temporary even though they may have many years of service in the District of Columbia school system. In my judgment, it is desirable and equitable that remedial legislation designed to afford such employees an opportunity to participate in the health and life insurance programs open to other Federal and District of Columbia employees, be enacted.

Thus, I introduce for appropriate reference, a bill designed to include such temporary teachers employed by the Board of Education within the purview of the health and life insurance programs now available to permanent teachers employed by the District of Columbia Board of Education. This legislation has the endorsement of the District of Columbia Board of Commissioners. I ask unanimous consent that the bill be printed at this point in my remarks.

The VICE PRESIDENT. The bill will be received and appropriately referred; and, without objection, the bill will be printed at this point in the RECORD.

The bill (S. 1340) to amend the Federal Employees Health Benefits Act of 1959 so as to authorize certain teachers employed by the Board of Education of the District of Columbia to participate in a health-benefits plan established pursuant to such act and to amend the Federal Employees' Group Life Insurance Act of 1954 so as to extend insurance coverage to such teachers; introduced by Mr. MORSE, was received, read twice by its title, referred to the Committee on Post Office and Civil Service, and ordered to be printed in the RECORD, as follows:

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That section 3(a) of the Federal Employees Health Benefits Act of 1959 (73 Stat. 710; 5 U.S.C. 3002 (a)) is amended by striking out the period at the end thereof and inserting in lieu thereof the following: "Provided, That no teacher in the employ of the Board of Education of the District of Columbia, whose salary is established by section 1 of the District of Columbia Teachers' Salary Act of 1955 (69 Stat. 521), as amended (sec. 31-1501, D.C. Code, 1961 edition), shall be excluded on the basis of the fact that such teacher is serving under a temporary appointment if such teacher has been so employed by such Board for a period or periods totaling not less than two school years."

SEC. 2. Section 2(a) of the Federal Employees' Group Life Insurance Act of 1954 (68 Stat. 736), as amended (5 U.S.C. 2091 (a)), is amended by striking out the period at the end thereof and inserting in lieu

thereof the following: "and in no event shall any teacher in the employ of the Board of Education of the District of Columbia, whose salary is established by section 1 of the District of Columbia Teachers' Salary Act of 1955 (69 Stat. 521), as amended (sec. 31-1501, D.C. Code, 1961 edition), be excluded on the basis of the fact that such teacher is serving under a temporary appointment if such teacher has been so employed by such Board for a period or periods totaling not less than two school years."

SEC. 3. The amendments made by this Act shall take effect on the first day of the first month which begins not later than the sixtieth day after the date of its enactment.

STEEL SHIPPING CONTAINER IDENTIFICATION ACT, 1963

Mr. HARTKE. Mr. President, on behalf of myself and the Senator of Pennsylvania [Mr. SCOTT], I introduce, for appropriate reference, a bill intended to permit the buyers of steel shipping containers to know when steel is used in the manufacture of the containers and to promote the use of steel produced in this country.

The bill, to be known as the Steel Shipping Container Identification Act of 1963, is endorsed by the Steel Container Shipping Institute, who believe that such legislation will be of great benefit to the steel industry, to the steel shipping container industry, and to the general public.

U.S. customs laws require that a foreign product be plainly marked with the country of origin in which it is produced. The courts sustain the fact that the authority and jurisdiction of the Bureau of Customs ends when the product has been released from its custody. This, in turn, means that while the bundles or coils of sheet steel are marked with the country of origin upon arrival in this country, no agency of the United States under present regulations has any further jurisdiction over the marking or identification of products, such as drums, pails, and like containers, which are ultimately manufactured from the imported sheet steel.

The proposed bill, Mr. President, would require that drums, pails, and like containers, made of foreign steel be plainly marked with the country of origin of the steel and would place enforcement of the act under the jurisdiction of the Federal Trade Commission and would include their usual penalties for noncompliance.

This act is not otherwise punitive and does not ask special favors, increased duties or tariff protection. It only requires that containers made from foreign steel be so identified.

It is hoped, Mr. President, that with the practice of our own steel producers being beat competitively with the use of foreign steel in drums, pails, and like containers that these items should be marked so that the general buying public at least will know whether they are purchasing a product made with foreign steel or with domestic steel.

Mr. President, so that my distinguished colleagues may have the opportunity to join with me in sponsorship of this proposed legislation, I ask unanimous consent that the bill to lie on the table until Friday, April 26, 1963.

The VICE PRESIDENT. The bill will

be received and appropriately referred, and, without objection, the bill will lie on the desk, as requested by the Senator from Indiana.

The bill (S. 1342) to prohibit the introduction into interstate commerce of any shipping container manufactured in the United States from imported steel unless the container is marked so as to indicate the country of origin of the steel, introduced by Mr. HARTKE (for himself and Mr. SCOTT), was received, read twice by its title, and referred to the Committee on Commerce.

Mr. BEALL. Mr. President, will the Senator yield?

Mr. HARTKE. I yield.

Mr. BEALL. The Senator is putting forth a most commendable idea. It is very foresighted action on the part of the Senator to introduce the bill. I should like to join him in sponsoring it.

Mr. HARTKE. I thank the Senator from Maryland. He has always stood with me in these matters both in the Committee on Commerce and in the Committee on the District of Columbia.

ESTABLISHMENT OF WATER RESOURCES RESEARCH CENTERS—AMENDMENTS

Mr. LONG of Louisiana submitted amendments, intended to be proposed by him, to the bill (S. 2) to establish water resources research centers at land-grant colleges and State universities, to stimulate water research at other colleges, universities and centers of competence, and to promote a more adequate national program of water research, which were ordered to lie on the table and to be printed.

Mr. YARBOROUGH submitted an amendment, intended to be proposed by him, to Senate bill 2, supra, which was ordered to lie on the table and to be printed.

CANYONLANDS PARK—AMENDMENTS

Mr. MOSS. Mr. President, in this morning's Washington Post and Times Herald there appeared an editorial entitled "Canyonlands Park," which discusses the proposal which will be before the Committee on Interior and Insular Affairs this coming Thursday, for the creation of Canyonlands National Park in southeastern Utah. This editorial is a very clear exposition of the situation now existing, and I ask unanimous consent that it may be printed in the RECORD.

There being no objection, the editorial was ordered to be printed in the RECORD, as follows:

CANYONLANDS PARK

The outlook for creation of another magnificent national park in the West has notably improved with the current agreement within the Utah congressional delegation and among State officials. The park would be located in what has come to be known as Canyonlands at the confluence of the Green and Colorado Rivers in southeastern Utah. This is one of the wildest and most inaccessible areas in the United States, and the proposed park is said to be a wonderland that cannot be matched by any Ameri-

can scenery now outside national park boundaries.

Canyonlands has found high favor with the National Parks Service, and National Parks Association, conservationists and outdoorsmen. Senator FRANK E. Moss has sponsored a bill to authorize establishment of the proposed park, but in the last session of Congress there was sharp disagreement over the land to be included. Now a compromise has been reached between Gov. George Clyde and Senator WALLACE F. BENNETT, on one hand, and Senator Moss, on the other, to limit the area to a little more than 250,000 acres.

Agreement has also been reached on the phasing out of mineral and oil exploration in the area within 25 years. Mines and wells developed during that period could continue to operate. This is the most questionable aspect of the agreement but there is some precedent for such continued operations in areas that have become national parks. The most important thing is to set aside the finest scenic features of this area for park purposes. Additional land can be acquired later if that seems desirable. The reduced acreage would include the spectacular areas that have come to be known as Chesler Park, Virginia Park, Druid Arch, Angel Arch, Elephant Canyon, Upheaval Dome, the Needles, and the Basin of Standing Rocks.

Hearings on the new Moss bill will be held by the Senate's Public Lands Subcommittee on April 25, and it is to be hoped that similar action will be taken on the House side. The rapid growth of the country makes it especially desirable to conserve scenic areas of national park quality. If it is found feasible to link Canyonlands with the Zion, Bryce, and Grand Canyon National Parks, with the Glen Canyon Dam and the Arches and Natural Bridges National Monuments in the same general area, the combination would make a strong bid for first place among the country's scenic playgrounds.

Mr. MOSS. Mr. President, I also ask unanimous consent that I may be permitted to submit at this time two proposed amendments to S. 27, which is the Canyonlands National Park bill; and that these amendments may be printed, so as to be available at the time of the hearing on Thursday.

The VICE PRESIDENT. The amendments will be received, printed, and referred to the Committee on Interior and Insular Affairs.

AMENDMENT OF NATIONAL LABOR RELATIONS AND RAILWAY LABOR ACTS—RESCISSION OF ORDER FOR BILL TO LIE ON DESK

Mr. ALLOTT. Mr. President, previously the bill (S. 1330) to amend the National Labor Relations Act and the Railway Labor Act with respect to emergency labor disputes, was ordered to lie on the table. I ask unanimous consent that that order be rescinded, and that the bill be printed.

The VICE PRESIDENT. Without objection, it is so ordered.

HOUSING FOR THE ELDERLY—ADDITIONAL COSPONSOR OF BILL

Mr. CLARK. Mr. President, I ask unanimous consent that when the bill (S. 1171), in aid of housing for the elderly, is next printed, the name of the Senator from Oregon [Mrs. NEUBERGER] may be added as a cosponsor.

The VICE PRESIDENT. Without objection, it is so ordered.

ESTABLISHMENT OF A METRIC SYSTEM IN THE UNITED STATES—ADDITIONAL COSPONSOR OF BILL

Mr. PELL. Mr. President, I ask unanimous consent that the distinguished Senator from Oregon [Mrs. NEUBERGER] be allowed to become cosponsor with me of S. 1278, which I introduced on April 4. I ask that her name be included at the next printing of this bill. This bill, which would authorize the Bureau of Standards to study the feasibility of adopting the metric system in the United States, is of basic importance to the entire Nation; and I am immensely pleased and honored to have the Senator from Oregon associated with me in its passage.

The VICE PRESIDENT. Without objection, it is so ordered.

NATIONAL EMERGENCY LABOR DISPUTES ACT OF 1963—ADDITIONAL COSPONSOR OF BILL

Under authority of the orders of the Senate of April 18, 1963, and today April 22, 1963, the name of Mr. AIKEN was added as a cosponsor of the bill (S. 1330) to amend the National Labor Relations Act and the Railway Labor Act with respect to emergency labor disputes, introduced by Mr. JAVITS on April 18, 1963.

PRESS RELEASE ON CERTAIN HEARINGS BEFORE COMMITTEE ON FOREIGN RELATIONS

Mr. FULBRIGHT. Mr. President, I ask unanimous consent to insert in the RECORD at this point the text of a press release issued on April 19 announcing hearings on S. 414 and other bills pending before the Committee on Foreign Relations which relate to the training of foreign affairs personnel.

There being no objection, the press release was ordered to be printed in the RECORD, as follows:

APRIL 19, 1963.

U.S. SENATE COMMITTEE ON FOREIGN RELATIONS

Senator J. W. FULBRIGHT, chairman, announced today that on April 29 and May 1, the Committee on Foreign Relations would hold hearings on S. 414, a bill to create a Freedom Commission and Freedom Academy. S. 414 was introduced on January 22 by Senator MUNDT, for himself and other Senators.

On April 4 and 5 of this year the committee held public hearings on S. 865, an administration bill to establish a National Academy of Foreign Affairs. S. 865 was introduced by Senator SYMINGTON, for himself and other Senators on February 20.

Also pending before the Committee are S. 32 and S. 99, bills to create a U.S. Foreign Service Academy. Both of these bills were introduced on January 14, S. 32 by Senator SMATHERS and S. 99 by Senator DOMINICK.

Anyone wishing to present testimony on any of the aforementioned bills during the course of the hearings announced today should contact without delay Mr. Darrell St. Claire, chief clerk, Committee on Foreign Relations.

NOTICE OF HEARING ON S. 63, TO PROVIDE FOR REPRESENTATION OF INDIGENT DEFENDANTS, AND S. 1057, TO PROMOTE THE CAUSE OF CRIMINAL JUSTICE BY PROVIDING FOR THE REPRESENTATION OF DEFENDANTS WHO ARE FINANCIALLY UNABLE TO OBTAIN AN ADEQUATE DEFENSE IN CRIMINAL CASES IN THE COURTS OF THE UNITED STATES

Mr. EASTLAND. Mr. President, on behalf of the Committee on the Judiciary, I desire to give notice that public hearings have been scheduled beginning Monday, May 6, 1963, at 10:30 a.m., in Room 2228, New Senate Office Building, on S. 63, a bill to provide for representation of indigent defendants, and S. 1057, a bill to promote the cause of criminal justice by providing for the representation of defendants who are financially unable to obtain an adequate defense in criminal cases in the courts of the United States.

At the indicated time and place all persons interested in the above bills may make such representation as may be pertinent.

NOTICE OF HEARING ON NOMINATION OF L. J. ANDOLSEK TO BE A CIVIL SERVICE COMMISSIONER

Mr. JOHNSTON. Mr. President, as chairman of the Post Office and Civil Service Committee, I wish to announce that a public hearing on the nomination of L. J. Andolsek to be a civil service commissioner will be held Wednesday, April 24, 1963, at 10:30 a.m., in room 6202 of the New Senate Office Building.

The hearing will be open to the public and will be held before the full committee.

ADDRESSES, EDITORIALS, ARTICLES, ETC., PRINTED IN THE APPENDIX

On request, and by unanimous consent, addresses, editorials, articles, etc., were ordered to be printed in the Appendix, as follows:

By Mr. HARTKE:

Address by Senator BAYH at Indiana Democratic Jefferson-Jackson Day dinner on April 6, 1963.

Editorial entitled "Wabash Could be Navigable," published in the Pike County, Ind., Dispatch of April 4, 1963.

Editorial entitled "Lincoln Heritage Trail," published in the Elkhart, Ind., Truth, dealing with the need for marking the trail which Abraham Lincoln took during his formative years.

By Mr. MONROE:

Address entitled "Upstream Flood Control in Oklahoma," delivered by Miss Sally Cooksey, a high school senior from Ada High School, Oklahoma, before the 34th annual State convention of the Oklahoma Garden Clubs, Inc.

By Mr. MORSE:

Article entitled "U.S. Agencies Praised," written by Frank E. Karelsen, published in the New York Times on April 6, 1963.

By Mr. ROBERTSON:

Article entitled "Senator ROBERTSON Explains Cost of Adding National Holidays," written by Frank E. Taylor, published in

for among Milledgeville's 50 doctors, many of dubious repute, were only three psychiatrists.

Milledgeville has now been taken out of what politics and reformed by a topflight psychiatrist imported from New York, Dr. Irville MacKinnon. Its budget is up from \$2.49 per patient per day to \$3.29 (against a national average of \$5.40). It has 50 psychiatric doctors, admits 6,000 new patients a year, and sends 60 percent of them home within 90 days.

NO BARS, NO LOCKS

More surprising than Georgia's backlog of woes, though, is that even before the 1959 scandal it had started an earnest effort to save its citizens from Milledgeville. Psychiatric clinics were set up in general hospitals for prompt and intensive treatment of the mentally ill, and outgoing Gov. Marvin Griffin put aside \$300,000 in surplus funds to get the movement rolling.

In Atlanta's Grady Memorial Hospital, one of the first such clinics is now one of the most relaxed places in that vast and forbidding pile. Its windows have no bars, its doors are unlocked. Its four doctors and six nurses are more informal than their colleagues elsewhere in the hospital. Only a neat little name tag marks them as "staff." Patients are kept busy with psychotherapy (some of it in groups), occupational therapy and their own chores. Nearly all receive drug treatment, though few now get shock.

The Grady unit has 18 beds. Georgia also has a 20-bed unit in Augusta, and there are centers with 10 to a dozen beds in Macon, Columbus and Albany. But because the facilities are still so limited, the Georgia clinics have strict eligibility rules. To get in, a patient must have the backing of a psychiatrist and another physician; he must be seeking help voluntarily; he cannot be currently addicted to drugs or alcohol; and the admitting psychiatrist must be convinced that his illness is likely to be arrested within a month.

By now, more than 2,600 patients have passed through the Georgia centers. Fewer than 300 have had to go on to Milledgeville, as against 1,700, the doctors estimate, who otherwise would have had to go there.

LINEUP OF DOCTORS

Other widely separated states are approaching the twin goals of early detection and intensive treatment by different methods:

New Mexico is the proving ground for a plan financed by the National Institute of Mental Health. In three areas, each embracing three counties, the state has installed a "community mental-health consultant" in the office of a county health department. Their job is to serve as counselors, to spot the client who is so disturbed that he should become a patient, and to refer him elsewhere for prompt treatment. But in practice, virtually every client has been so relieved by talking things out with his consultant (and sometimes his minister as well) that an imminent crackup has apparently been averted. For those with more severe upsets, scattered over New Mexico's sparsely settled acreage, Psychiatrist William Sears goes barnstorming in his own plane, visits each district at least once a month. In 3 years the 3 consultants have handled 1,800 cases in 2,775 interviews, referred fewer than 1 percent for intensive psychiatric treatment.

Illinois has 40 community clinics scattered around the State and has been supplying outpatient treatment for years. But for the more severely ill, instead of patching up the gloomy old State hospitals, Dr. Francis J. Gerty, director of the department of mental health, plans to spend \$50 million on eight "hospital clinics." They will be so distributed that no one in the State will have more than a 2-hour drive to reach one: two in Chicago, one each in Centralia, Peoria,

Springfield, Harrisburg, Rockford, and Decatur-Champaign.

Nebraska has been trying possibly the most fundamental approach to prompt treatment for the mentally ill, and is now being acclaimed as the Nation's second most advanced State in the promotion of mental health—after neighboring Kansas. Guided by Dr. Cecil W. Wittson, Nebraska's program aims at training the family doctor, pediatrician, internist and obstetrician-gynecologist to handle the everyday emotional problems of their patients. The Nebraska Psychiatric Institute invites family doctors to Omaha for training in consultation and observation of patients. They may even bring their own patients along for study. Back home, they are expected to set aside one-half day a week for patients with emotional problems. Twenty of them now have an average of 18 psychiatric patients each. And for a 6-month course in family-practice psychiatry scheduled to begin July 1, it is the doctors, for a change, who are lined up on a waiting list and not the patients.

MESSAGE FROM THE HOUSE

A message from the House of Representatives, by Mr. Bartlett, one of its reading clerks, announced that the House had agreed to the amendments of the Senate to the bill (H.R. 4715) to incorporate the Eleanor Roosevelt Memorial Foundation, Inc.

ESTABLISHMENT OF WATER RESOURCES RESEARCH CENTERS

Mr. MANSFIELD. Mr. President, is there further morning business?

The PRESIDING OFFICER. Is there further morning business? If not, morning business is closed.

Mr. MANSFIELD. I ask unanimous consent that the unfinished business be laid before the Senate and made the pending business.

The PRESIDING OFFICER. Without objection, the Chair lays before the Senate the unfinished business, which will be stated by title for the information of the Senate.

The LEGISLATIVE CLERK. A bill (S. 2) to establish water resources research centers at land-grant colleges, and State universities, to stimulate water research at other colleges, universities, and centers of competence, and to promote a more adequate national program of water research.

Mr. MANSFIELD. Mr. President, I suggest the absence of a quorum.

The PRESIDING OFFICER. The clerk will call the roll.

The legislative clerk proceeded to call the roll.

Mr. KUCHEL. Mr. President, I ask unanimous consent that the order for a quorum call be rescinded.

The PRESIDING OFFICER. Without objection, it is so ordered.

Mr. WILLIAMS of Delaware rose.

The PRESIDING OFFICER (Mr. LAUSCHE in the chair). The Chair recognizes the Senator from Delaware.

DELINQUENT FEDERAL TAXES

Mr. WILLIAMS of Delaware. Mr. President, today I present the ninth annual report on delinquent Federal taxes. This report is rendered as of December

31, 1962, and as in preceding years is broken down by district offices, first to show the delinquencies in employment taxes and second to show the total of all delinquent Federal taxes, including employment.

Under the term "employment taxes" are included withheld income taxes, social security taxes, unemployment taxes, railroad retirement, and so forth.

The total for all types of tax delinquencies in the United States for the year ending December 31, 1962, showed an increase of 3.5 percent or \$1,100,780,000 as compared to \$1,063,248,000 on December 31, 1961. This compares with a total of \$1,614,494,000 in 1954—the first year in which these statistics were assembled.

While this represents a 3.5-percent increase in the overall tax delinquencies over last year, nevertheless when compared to the first report—1954—of \$1,614,494,000 it is still a creditable record showing a little over a \$500-million drop in total tax delinquencies during the past 9-year period.

Delinquent employment tax by December 31, 1962, had dropped 9 percent, as compared to the previous year, or from \$268 million to \$242 million. But this still remains an item which should be given continued attention. We must never overlook the fact that these employment taxes represent money which is withheld from the pay envelopes of the employees, and under no circumstances should they ever be considered or used as funds belonging to the employer.

Spectacular increases will be noted in some of the small district offices such as in Burlington, Vt., and Portsmouth, N.H., which show increases of 324.8 percent and 449.9 percent, respectively, in tax delinquencies for last year. The letter of the Commissioner, however, points out that these two increases largely result from the assessment of a certain large account involving a single taxpayer in those respective areas.

A similar explanation appears in connection with the San Francisco district, which shows an 80-percent increase in total tax delinquencies or an increase from \$57,977,000 in 1961 to \$104,359,000 in 1962. The Commissioner's letter points out that the issuance in December of income and gift tax delinquent accounts totaling over \$68 million in the case of two taxpayers in the San Francisco district accounts for most of this unusual increase.

Even after taking into consideration these unusual increases outlined above, the 1962 report still shows better than a \$500 million reduction in the total amount of tax delinquencies during the past 9 years, and it is in the face of this accomplishment under the reorganization act which was approved in 1952 that there is a question in the minds of some concerning the wisdom of the recently proposed concentration of the work in the large area offices.

I was a strong supporter of the reorganization act approved in 1952 which embraced several changes in the old procedure of tax collecting facilities. Significant in these changes were two particular and very essential points. The

first was the removing of the directors from political patronage by placing them under civil service. The second was the decentralization of the workload from the heavily concentrated areas into the smaller regional offices.

In my opinion each of these points was of major importance, and while no one could assess to what extent either or both played in the accomplishment of a \$500 million reduction in our total tax delinquencies, nevertheless I am concerned by that portion of the recent reorganization plan which reverses this decentralization idea and once again starts to concentrate the workload in the major offices.

That does not mean that some parts of the Commissioner's reorganization plan may not have merit or that the elimination of some area offices may not be wise, but I would strongly recommend caution before proceeding too far in reestablishing a system patterned after the old regime. We must not forget that the concentration of too much authority at the Washington level was the downfall of the old system.

Under the decentralization provisions of the reorganization plan the \$500 million reduction in total tax delinquencies speaks for itself.

The 1962 report for the various offices is as follows:

Augusta, Maine, has a good report for 1962. Employment tax delinquencies were reduced 38.4 percent, and total tax delinquencies were reduced 13.7 percent. However, even with this drop the total tax delinquencies for 1963 are still higher than they were in 1954.

Boston, Mass., again has a very bad report. While showing a 4.2-percent decline in employment tax delinquencies, it shows a 17.3-percent increase in total tax delinquencies, bringing the total tax delinquencies in this office to an alltime high since these records were first computed. Delinquent accounts in this office have over the years consistently been increasing while the rest of the country has on an average been achieving a reduction of over 30 percent. This office needs the attention of the Commissioner.

Burlington, Vt., shows a reduction of 24.1 percent in its employment tax delinquencies but an increase of nearly 325 percent in total tax delinquencies; however, as the Commissioner points out, this drastic increase is largely accounted for by the assessment of one large delinquent account.

Mr. AIKEN. Mr. President, will the Senator from Delaware yield?

Mr. WILLIAMS of Delaware. I yield.

Mr. AIKEN. I wish to advise the Senator from Delaware that since he received those figures, the Goldfine property in Vermont has been sold. There was a \$3 million tax delinquency on the part of that one concern, but it cannot be carried as a delinquent tax in Vermont any more. As the Senator from Delaware knows, the Goldfine delinquency of \$3 million was charged to every State where Goldfine owned any property. He owned \$500,000 or \$600,000 worth of property in Vermont, so Vermont was charged with that delinquency.

In my opinion, the small Internal Revenue offices, which Mr. Caplin is proposing to emasculate, are among the most efficient in the country. For instance, in Burlington, Vt., every tax return that was received on or before April 15 was tabulated and every dollar of the receipts deposited in the bank by April 18—within 3 days. If the Boston office can show any record that even remotely approaches the record of the Burlington office, I should be very much surprised.

I commend the Senator from Delaware for his exceptionally good work in trying to keep the Internal Revenue Service on the straight road. We all recall the Senator's reaction a few years ago, when he learned that there were so many delinquents in the Internal Revenue offices themselves. There seemed to be more in the offices than there were among the general taxpayers. The Senator performed a remarkable service in disclosing that fact. Of course, it cost quite a large sum to operate our penal institutions for a few years after that. The Senator performed a remarkable service then, and he is doing so now.

If the Internal Revenue Service in Washington would only ask its directors in the States where it is proposed to reduce the size of the offices how money can be saved, every one of them could tell how the cost of operating the offices could be reduced. But, as Mr. Caplin told us the other day at a hearing before the Committee on Finance, the Internal Revenue Service has established a management pattern and requires every office to hire so much management. Whether it be in New York City or in Anchorage, Alaska, it is necessary to hire the same number of supervisory personnel. That is ridiculous, because so large a number of officials is not needed in the smaller offices.

Again, I commend the Senator from Delaware for the excellent work he is doing.

Mr. WILLIAMS of Delaware. I thank the Senator from Vermont. As the report and the Commissioner's letters point out, Vermont has a fair record over a period of years. The drastic increase in this year's report is accounted for by the assessment of one large account. That is true also in the instance of Portsmouth, N.H., whose report I shall discuss in a moment.

Mr. AIKEN. Each year the national office of the Internal Revenue Service establishes collection goals. The Vermont office has well exceeded its goals in every way, for whatever purpose they have been established.

Mr. WILLIAMS of Delaware. Mr. President, Hartford, Conn., has made progress in reducing both its employment tax delinquencies and its total tax delinquencies, showing a reduction of 16.6 percent and 11.5, respectively.

Portsmouth, N.H., like Burlington, Vt., shows a drastic increase in total tax delinquencies of nearly 450 percent; however, again this results from the assessment of one large account. It should be noted that without this account Portsmouth has over the past 9 years been

consistently making progress toward bringing its delinquencies in line.

Providence, R.I., decreased its employment tax delinquencies by 11 percent and total tax delinquencies by 12 percent.

Albany, N.Y., shows a reduction in its employment tax delinquencies of 29.6 percent and a 19.6 percent in total delinquencies. Both figures represent all-time lows in this office.

Brooklyn, N.Y., reports an 8.2 percent increase in its employment tax delinquencies and a less than 1 percent reduction in total tax delinquencies. This latter figure is a 9-year low.

Buffalo, N.Y., has reduced its employment tax delinquencies during the past 9 years by approximately \$500,000 and reduced its total tax delinquencies by over \$7 million, with the 1962 results showing a 14.7 percent and 8.7 percent reduction in employment and total tax delinquencies, respectively. Both of these accounts for 1962 are at an all-time low.

Lower Manhattan and Upper Manhattan were combined in 1960 and are now reported as Manhattan, N.Y. Their combined reports show a 14.8 percent reduction in employment tax delinquencies this year and a 5.1 percent reduction in their total tax delinquencies. These two offices have reduced their total tax delinquencies since 1954 from \$329 million to \$110 million in 1962. During this same period employment tax delinquencies in these two combined offices have been reduced from \$44 million to \$24 million. Both of these offices were in bad shape prior to the reorganization in 1952, and I commend them on their progress during this entire 9-year period. The 1962 figures represent lows for these offices.

Syracuse, N.Y., shows a reduction of 19.5 percent in its employment tax delinquencies, but this still leaves the account higher than it was 9 years ago. Total tax delinquencies were increased by 1.4 percent over last year, with that item approaching a 9-year high.

Baltimore, Md., turned in a good report for 1962, showing a reduction in both employment tax delinquencies and total tax delinquencies of 16.5 and 25.4 percent, respectively.

Camden, N.J., is another office which has not done too well in reducing its delinquent accounts over the past 9 years, showing a reduction in 1962 of 1.3 percent in employment tax delinquencies and a 3.3 percent reduction in total tax delinquencies, but employment tax delinquencies are still nearly 60 percent higher than they were in 1954, and total tax delinquencies are also higher than the first year in which these records were assembled. This office likewise needs attention, particularly in reference to its employment tax delinquencies.

Newark, N.J., shows an increase of 5.6 percent in employment tax delinquencies and 1.2 percent in total tax delinquencies; however, over the 9-year period this office has shown progress in both categories, each having been reduced by approximately 50 percent.

Philadelphia, Pa., shows a 30.3 percent increase in its total tax delinquencies during 1962 against a 2.8 percent

TOTALS

Year	Employment tax		Percent increase or decrease over preceding year	Total taxes		Percent increase or decrease over preceding year	Year	Employment tax		Percent increase or decrease over preceding year	Total taxes		Percent increase or decrease over preceding year
	Number	Amount (in thousands)		Number	Amount (in thousands)			Number	Amount (in thousands)		Number	Amount (in thousands)	
1954	390,398	\$254,062		1,725,474	\$1,614,494		1959	256,287	\$216,439	-17.7	949,146	\$1,071,016	-22.1
1955	399,269	284,803	+12.0	1,596,615	1,646,383	+1.9	1960	268,396	236,843	+9.4	1,023,770	1,072,440	+1.1
1956	356,748	279,183	-1.9	1,660,685	1,619,629	-1.6	1961	316,612	268,465	+13.3	1,071,600	1,063,248	-.8
1957	377,253	300,678	+7.6	1,554,876	1,504,709	-7.0	1962	257,421	242,375	-9.7	976,147	1,100,780	+13.5
1958	329,457	263,186	-12.4	1,280,642	1,375,737	-8.5							

¹ Merged with Upper Manhattan as Manhattan.

² Merged with Lower Manhattan as Manhattan.

³ Merged with Cincinnati.

⁴ Merged with Cleveland.

⁵ Alaska included in Seattle prior to 1962. Percentage change for Seattle for 1962 adjusted to reflect separation of Alaska from that office.

⁶ Result of district offices' transferring to this division delinquent accounts of taxpayers known to be abroad and out of reach.

UNANIMOUS-CONSENT REQUEST AND LEGISLATIVE PROGRAM

Mr. CHURCH obtained the floor.

Mr. MANSFIELD. Mr. President, will the Senator yield?

Mr. CHURCH. I am happy to yield to the Senator from Montana provided I do not lose my right to the floor.

Mr. MANSFIELD. Mr. President, after conferring with the distinguished acting minority leader, the Senator from California [Mr. KUCHEL], the senior Senator from Colorado [Mr. ALLOTT], and others, I wish to propound a unanimous-consent request. I send it to the desk and ask that it be read.

THE PRESIDING OFFICER. The unanimous-consent request will be read.

The Chief Clerk read as follows:

UNANIMOUS-CONSENT AGREEMENT

Ordered, That, effective on Tuesday, April 23, 1963, at the conclusion of routine morning business, during the further consideration of the bill S. 2, the so-called Water Resources Research Act, debate on any amendment, motion, or appeal, except a motion to lay on the table, shall be limited to 1 hour, to be equally divided and controlled by the mover of any such amendment or motion and the majority leader: *Provided*, That in the event the majority leader is in favor of any such amendment or motion, the time in opposition thereto shall be controlled by the minority leader or some Senator designated by him: *Provided further*, That no amendment that is not germane to the provisions of the said bill shall be received.

Ordered further, That on the question of the final passage of the said bill debate shall be limited to 1 hour, to be equally divided and controlled, respectively, by the majority and minority leaders: *Provided*, That the said leaders, or either of them, may, from the time under their control on the passage of the said bill, allot additional time to any Senator during the consideration of any amendment, motion, or appeal.

THE PRESIDING OFFICER. Is there objection to the request of the Senator from Montana? The Chair hears none, and it is so ordered.

Mr. MANSFIELD. Mr. President, will the Senator yield further?

Mr. CHURCH. I yield.

Mr. MANSFIELD. I wish to announce to the Senate that the distinguished Senator from New Mexico [Mr. ANDERSON] will lead off in the debate on the measure this afternoon. I assume that the distinguished Senator from Colorado [Mr. ALLOTT] and other Sen-

ators will have something to say on the subject.

If there is a lag in the discussion of S. 2, the water resources bill, it is the intention of the leadership to call up the bill S. 1007 to guarantee electric consumers in the Pacific Northwest first call on electric energy generated at Federal hydroelectric plants in that region and to guarantee electric consumers in other regions reciprocal priority, and for other purposes.

I merely make that announcement so that the Senate can be prepared.

I thank the Senator from Idaho [Mr. CHURCH] and the Senator from Rhode Island [Mr. PASTORE] who also has been waiting to address the Senate.

THE U.S.S. "THRESHER"

Mr. PASTORE. Mr. President, on the morning of April 9, at 8 a.m., the SS(N) 593 departed Portsmouth Naval Shipyard to undergo sea trials following extensive shipyard overhaul. This submarine, the U.S.S. *Thresher*, under command of Lt. Comdr. John W. Harvey, had aboard 112 naval personnel and 17 civilians. These men who set sail that morning were never again to see their families and their loved ones. The following morning, while undergoing a deep test dive, approximately 200 miles off the coast of Cape Cod, the submarine went down with all hands. I ask unanimous consent to have printed in the RECORD at this point the names of those men, civilians and military, who went down with the *Thresher*—men whose names will forever be part of the tradition of the U.S. Navy.

There being no objection, the names were ordered to be printed in the RECORD, as follows:

Mr. Fred P. Abrams.
Lt. Comdr Philip H. Allen, U.S. Navy.
Tilmen J. Arsenaault, Enca (SS)-P2, U.S. Navy.
Lt. (jg.) Ronald C. Babcock, U.S. Navy.
Ronald E. Bain, En2(SS)-P2, U.S. Navy.
Mr. Daniel W. Beal, Jr.
John E. Bell, Mm1-P2, U.S. Navy.
Lt. Robert D. Biederman, U.S. Navy.
Lt. Comdr. John H. Billings, U.S. Navy.
Edgar S. Bobbitt, Em2(SS)-P2, U.S. Navy.
Gerald C. Boster, Em3(SS)-P1, U.S. Navy.
George Braceyn, Sd3(SS), U.S. Navy.
Richard P. Brann, En2(SS)-P2, U.S. Navy.
Richard Carkoski, En2(SS), U.S. Navy.
Patrick W. Carmody, Sk2, U.S. Navy.
Steven G. Cayey, Tm2(SS), U.S. Navy.

Mr. Robert E. Charron.
Edward Christiansen, Sn(SS), U.S. Navy.
Larry W. Claussen, Em2(SS)-P2, U.S. Navy.
Thomas E. Clements, Etr3(SS), U.S. Navy.
Lt. Merrill F. Collier, U.S. Navy.
Mr. K. R. Corcoran.
Mr. Kenneth J. Critchley.
Francis M. Cummings, Sos2(SS), U.S. Navy.
Mr. Paul C. Currier.
Samuel J. Dabruzzi, Etn2(SS), U.S. Navy.
Clyde E. Davidson III, Etr3-P1, U.S. Navy.
Donald C. Day, En3(SS), U.S. Navy.
Roy O. Denny, Jr., Em1(SS)-P2, U.S. Navy.
Mr. Richard R. DesJardins.
Peter J. DiBella, Sn, U.S. Navy.
Mr. George J. Dineen.
Lt. Comdr. Michael J. DiNola, U.S. Navy.
Don R. Dundas, ETN2(SS), U.S. Navy.
Troy E. Dyer, ET1(SS)-P1, U.S. Navy.
Mr. Richard K. Fisher.
Ellwood H. Fornl, SOCA(SS)-P1, U.S. Navy.
Raymond P. Foti, ET1(SS), U.S. Navy.
Larry W. Freeman, FTM2(SS), U.S. Navy.
Gregory J. Fusco, EM2(SS)-P2, U.S. Navy.
Andrew J. Gallant, HMCS(SS)-P2, U.S. Navy.
Napoleon T. Garcia, SD1(SS), U.S. Navy.
John E. Garner, YNSN(SS), U.S. Navy.
Lt. Comdr. Pat M. Garner, U.S. Navy, executive officer.
Robert W. Gaynor, EN2(SS), U.S. Navy.
Robert H. Gosnell, SA(SG), U.S. Navy.
Lieutenant (jg) John G. Grafton, U.S. Navy.
William E. Grahm, SOC(SS)-P1, U.S. Navy.
Mr. Paul A. Guerette.
Aaron J. Gunter, QM1(SS), U.S. Navy.
Richard C. Hall, ETR2(SS)-P2, U.S. Navy.
Lt. Comdr. John W. Harvey, U.S. Navy, commanding officer.
Norman T. Hayes, EM1-P2, U.S. Navy.
Laird G. Helser, MM1-P2, U.S. Navy.
Marvin T. Helsius, MM2, U.S. Navy.
Lieutenant (jg) James J. Henry, Jr., U.S. Navy.
Leonard H. Hewitt, EMCS(SS)-P2, U.S. Navy.
Joseph H. Hoague, TM2(SS), U.S. Navy.
James P. Hodge, EM2, U.S. Navy.
John F. Hudson, EN2(SS), U.S. Navy.
John P. Ingle, SN(SG), U.S. Navy.
Mr. Maurice F. Jaquay.
Brawner G. Johnson, FTG1(SS)-P2, U.S. Navy.
Edward A. Johnson, ENCA(SS), U.S. Navy.
Richard L. Johnson, RMSA, U.S. Navy.
Robert E. Johnson, TMC(SS)-P1, U.S. Navy.
Thomas B. Johnson, ET1(SS)-P2, U.S. Navy.
Richard W. Jones, EM2(SS), U.S. Navy.
Edmund J. Kalusa, SOS2(SS)-P1, U.S. Navy.
Thomas C. Kants, ETR2(SS), U.S. Navy.

Robert D. Kearney, MM3, U.S. Navy.
 Donald D. Keller, IC2(SS), U.S. Navy.
 Mr. D. Keuster.
 George J. Kiesecker, MM2(SS)-P2, U.S. Navy.
 Billy M. Klier, EN1(SS)-P2, U.S. Navy.
 Lieut. Comdr. Robert L. Krag, U.S. Navy.
 George R. Kroner, CS3, U.S. Navy.
 Norman G. Lannouette, QM1(SS), U.S. Navy.
 Wayne W. Lavoie, YN1(SS), U.S. Navy.
 Lt. Comdr. John S. Lyman, U.S. Navy.
 Templeman N. Mabry, EN2(SS)-P2, U.S. Navy.
 Lieutenant (jg) Frank J. Malinski, U.S. Navy.
 Richard M. Mann, Jr., IC2(SS), U.S. Navy.
 Julius F. Marullo, Jr., QM1(SS), U.S. Navy.
 Douglas R. McClelland, EM2(SS), U.S. Navy.
 Donald J. McCord, MM1(SS)-P2, U.S. Navy.
 Karl P. McDonough, TM3(SS), U.S. Navy.
 Sidney L. Middleton, MM1(SS)-P2, U.S. Navy.
 Mr. Henry Moreau.
 Ronald A. Mulise, CS2, U.S. Navy.
 James A. Musselwhite, ETSN(SS)-P2, U.S. Navy.
 Donald E. Nault, CS1(SS), U.S. Navy.
 Walter J. Noonis, RMC(SS), U.S. Navy.
 John D. Norris, ET1, U.S. Navy.
 Cheslev C. Oetting, EM2-P2, U.S. Navy.
 Mr. Franklin J. Palmer.
 Lt. (jg.) Guy C. Parsons, Jr., U.S. Navy.
 Roscoe C. Pennington, EMCA(SS)-P2.
 James G. Peters, EMCS-P2, U.S. Navy.
 James G. Phillippi, SOS2(SS), U.S. Navy.
 Dan A. Philput, EN2(SS)-P2, U.S. Navy.
 Richard Podwell, MM2-P2, U.S. Navy.
 Mr. Robert D. Prescott.
 John S. Regan, MM1(SS)-P2, U.S. Navy.
 James P. Ritchie, RM2, U.S. Navy.
 Pervis Robinson, SN, U.S. Navy.
 Glenn A. Rountree, QM2(SS), U.S. Navy.
 Anthony A. Rushetski, ETN2, U.S. Navy.
 James M. Schiewe, EM1(SS)-P2, U.S. Navy.
 Benjamin N. Shafer, EMCM(SS)-P2, U.S. Navy.
 John D. Shafer, EMCS(SS)-P2, U.S. Navy.
 Joseph T. Shimko, MM1-P2, U.S. Navy.
 Burnett M. Shotwell, ETRSN, U.S. Navy.
 Alan D. Sinnett, FTG2(SS), U.S. Navy.
 Lt. John Smars, Jr., U.S. Navy.
 William H. Smith, Jr., BT1-P2, U.S. Navy.
 Ronald H. Solomon, EM1-P2, U.S. Navy.
 Mr. D. Stadtmuller.
 Robert E. Steinel, SO1(SS)-P1, U.S. Navy.
 James L. Snider, MM1-P2, U.S. Navy.
 Rodger E. Van Pelt, IC1(SS)-P2, U.S. Navy.
 David A. Wasel, RMSN, U.S. Navy.
 Joseph A. Walski, RM1(SS)-P1, U.S. Navy.
 Charles L. Wiggins, FTG1-P2, U.S. Navy.
 Lt. (jg.) John J. Wiley, U.S. Navy.
 Donald E. Wise, MMCA(SS)-P2, U.S. Navy.
 Mr. Laurence E. Whitten.
 Ronald E. Wolfe, QMSN(SS), U.S. Navy.
 Jay H. Zweifel, EM2-P1, U.S. Navy.

Mr. PASTORE. Mr. President, the Nation mourns the loss of this submarine, the first nuclear submarine to be lost at sea. The submarine, however, can be replaced. What cannot be replaced are the lives of these 129 Americans. These men are irreplaceable.

A court of inquiry, under Vice Adm. Bernard L. Austin, has been convened, and since April 11 has been conducting an investigation to ascertain the cause of the loss. Admiral Austin, an officer experienced in the submarine service, is assisted on the court by other senior naval officers from the submarine service. They include Rear Adm. Lawrence Daspit; Capt. James B. Osborn, commanding officer of the first U.S. Polaris submarine—the U.S.S. *George Washington*; Capt. William C. Hushing, and

Capt. Norman G. Nash. Capt. Saul Katz is counsel to the court.

The court has been holding hearings at New London, Conn., and Portsmouth Naval Shipyard. The hearings are in public except where classified information is involved.

The Joint Committee on Atomic Energy by law is required to make continuing studies of problems relating to the development, use and control of atomic energy. In compliance with this responsibility, as chairman of the Joint Committee, upon notification of the loss of the *Thresher*, I sent two senior staff representatives to New London, Conn., as official observers to the court of inquiry. The two staff men—Executive Director John T. Conway and Assistant Director Edward J. Baner—have been present during the public and closed sessions as the court of inquiry has been receiving evidence. They traveled with the court by special military plane from New London, Conn., to Portsmouth, N.H., where the court moved the site of investigation on April 12.

Both of these committee staff men are particularly qualified to follow the course of the court of inquiry's investigation. Mr. Conway, a naval officer during World War II, holds a degree in engineering and in law and has been with the Joint Committee staff nearly 7 years. Mr. Baner is a retired Navy captain with 22 years of active duty. He holds a master's degree in nuclear engineering from MIT and actively participated in the development, design, and test of nuclear submarines including the first one, the *Nautilus*.

These two men have been in continuous contact with me and report that they are receiving the fullest cooperation from the Department of the Navy and the court of inquiry. All classified information and evidence being obtained by the court is being made available to the Joint Committee staff. Mr. Conway and Mr. Baner advise me that in their opinion the court of inquiry is making every effort to ascertain the true cause of this terrible accident with the hope and expectation of preventing similar occurrences in the future. The members of the court, career Navy officers of the submarine service, have a bond of affinity with their lost comrades that never can be fully understood by those who have not shared the common experiences and dangers of the men in the submarine service. This bond is such that it demands every effort be made to bring forth all facts and that no stone be left unturned in discovering what the fault or faults may be.

On April 17, as chairman of the Joint Committee on Atomic Energy, I represented the committee at memorial services conducted by Francis Cardinal Spellman at the Portsmouth Naval Shipyard, at the conclusion of which His Eminence met with the families of the lost men. I cannot describe to Senators the full depth of the feelings shared by those who were present at these services and the other services held that day by Bishop Henry Knox Sherrill of the Episcopal Church.

Mr. President, I ask unanimous consent to place in the RECORD at the conclusion of my remarks the prayer by Francis Cardinal Spellman and the memorial message by Bishop Henry Knox Sherrill, together with the eulogy by Bishop Daniel Feeney. I also request unanimous consent to place in the RECORD at the conclusion of my remarks the remarks of Rear Adm. J. Floyd Dreith, U.S. Navy, director of the chaplain's division, the remarks by Comdr. Karl G. Peterson, U.S. Navy, Protestant chaplain, Rabbi Abraham I. Jacobson, and the Honorable Kenneth BeLieu, Assistant Secretary of the Navy, at the memorial services for the U.S.S. *Thresher* at the Portsmouth Naval Shipyard on April 15, 1963.

The PRESIDING OFFICER. Is there objection to the request by the Senator from Rhode Island? The Chair hears none, and it is so ordered.

(See exhibit 1.)

Mr. PASTORE. Mr. President, many articles have been written and will be written in honor of the men of the U.S.S. *Thresher*. In a discussion with Vice Admiral Austin, president of the court of inquiry, at Portsmouth last week, he handed me a copy of an editorial of the April 13 issue of the New York Times which had been reprinted in the Portsmouth Naval Shipyard newspaper—the Portsmouth Periscope. Admiral Austin, himself a submariner, described this editorial as symbolizing the true spirit of the U.S. Navy submarine service. I ask unanimous consent to place the editorial in the CONGRESSIONAL RECORD at this point.

There being no objection, the editorial was ordered to be printed in the RECORD, as follows:

THRESHER

She was the finest product of the shipwright's art and one of the maritime marvels of this technological age.

Like the great fish for which she was named, her kingdom was the ocean and its black depths. She was the lead ship of a class designed to run silent, run deep, and run fast—deeper and faster than any submarine of the past. She was shaped like a teardrop and powered with the fissioned energy of the atom. Her cylindrical pressure hull of heavy steel was designed to withstand the crushing weight of deep water.

When the klaxon sounded and the command "Dive! Dive!" echoed through the boat last Wednesday morning there were no intimations of disaster. *Thresher* had already established her preeminence and power. Today, with Lieutenant Commander Harvey and his crew, she lies many fathoms deep off the Continental Shelf. The Navy that built her and manned her may never know what destroyed her; the silent forces of the deep are implacable enemies to detailed investigation.

Yet no investigation is needed to reiterate certain verities. Death—of a ship or a man—is not an end but a beginning; man builds upon the past. Throughout the history of the sea men have died and ships have sunk. In the endless history of conflict between man and nature men have lost but man has triumphed. The earth's mountains have been conquered; the blue sky and the realm of space are sealed and now the forbidding depths—so long beyond the reach of man—are in process of conquest.

Man's indomitable spirit has never in history faltered in such extensions of man's

those comments I complimented the able junior Senator from Indiana [Mr. BAYH] and the other witnesses who appeared during the first 2 days of hearings for the fine statements which were made in support of that bill.

I was not alone in that opinion. Mr. Barry Bingham, editor and publisher of the Courier-Journal, Louisville, Ky., on Saturday, April 13, 1963, published a fine editorial pointing out the merits of the cold war GI bill, not only for the deserving veterans, but for the whole country, as well.

Mr. President, I ask unanimous consent to have printed at the appropriate place in the RECORD, the editorial entitled "The Merits of a GI Bill for Cold War Veterans," published in the Courier-Journal, Louisville, Ky., of April 13, 1963.

There being no objection, the editorial was ordered to be printed in the RECORD, as follows:

THE MERITS OF A GI BILL FOR COLD-WAR VETERANS

Senator BIRCH BAYH, of Indiana, is one of the 39 Senate sponsors of a GI bill of cold-war veterans. Making his first appearance in behalf of major legislation, the freshman Senator had a persuasive case for the measure, which would give a new group of ex-servicemen educational and vocational training aid, as well as loan guarantees and direct loans for homes and farms.

The benefits would be available to veterans of the period from January 31, 1955, to June 1, 1963. Senator BAYH noted that only 46 percent of the men in the draft-eligible age group have seen military service since the end of the Korean war. "Those not required to serve in the Armed Forces," he told a Senate subcommittee, "have had the opportunity to advance themselves educationally, professionally, and financially. It is only fair and equitable that those men who have had their lives and careers interrupted by service be compensated for that interruption."

What he is proposing has much more merit than any veteran bonus plan, which would provide, in effect, only a one-shot handout. The great advantage to the kind of legislation Senator BAYH favors is that its effects are cumulative and its benefits of lasting value to the veteran and to the country as a whole.

Senator BAYH pointed out that money spent on the new group of veterans would be returned in taxes because of the higher incomes that "almost inevitably come from a higher education." This is a supportable theory, but whether, in this sense, it would be self-financing is not the main point.

The history of similar legislation for World War II and Korean veterans makes it clear, it seems to us, that its results in a broader sense, are in the national interest. This legislation underwrote the largest program of mass adult education the world has ever seen. There are intangibles here that cannot be measured in dollars and cents. The veterans alumni group numbers 11 million, including 460,000 engineers, 360,000 teachers, 130,000 doctors, dentists and nurses, and 150,000 scientists. Moreover, every fifth home started since the end of World War II was financed by a GI loan. This was important to the construction business, but it also was important to the psychological well-being of the millions of families who otherwise would not have been able to have a home of their own. And how much better for our social fabric to have millions of people exposed to higher education than to have them nursing festering grievances about being denied this opportunity after serving the Nation in crisis.

The country is richer because these opportunities were made available, and it could be

further enriched by extending them to cold-war veterans.

ESTABLISHMENT OF WATER RESOURCES RESEARCH CENTERS

The Senate resumed the consideration of the bill (S. 2) to establish water resources research centers at land-grant colleges, and State universities, to stimulate water research at other colleges, universities, and centers of competence, and to promote a more adequate national program of water research.

Mr. YARBOROUGH. Mr. President, I strongly endorse the enactment of S. 2—of which I have the privilege to be a cosponsor—the bill establishing water resources research centers at land-grant colleges and State universities and stimulating other water research.

This is a sound approach to what is to be the biggest problem in the future growth of many areas, including large parts of Texas: namely the need for water. My State, in parts somewhat arid, and with a fast-growing population and economy, is faced increasingly with the need for greater attention to the conservation of water. Much has been done in Texas toward water conservation; billions of dollars have been spent and will be spent toward assuring an adequate water supply.

This great expenditure for water-conservation facilities points up the curious fact that we have been relatively inattentive to the basic need of water-supply control and the need for research into the scientific problems of water conservation. At the hearings on this bill it was stated that nationwide at this time some \$10 billion annually are being spent on water facilities, but that expenditures on research on the basic problems amount to only three-fourths of 1 percent of that amount. This percentage for research seems far less than that found necessary by any of our great industries to maintain progress and development within their technologies. Because of the great importance of water to us, we must increase our efforts. There are too many unsolved problems in connection with the overall problems of water scarcity, water pollution, and adequate supplies of pure water.

We know it is not enough to construct a large dam. In my region of the United States, evaporation from a large reservoir under our hot sun can mean a staggering water loss. Research has been done on the effectiveness of spreading a chemical film over the water surface of such a reservoir, but no practical solution has yet been found. This is a prime target for research, one which would be of especial interest at research centers established in the Southwest. This bill is sound in encouraging such State or regional autonomy in the selection of the research problems of great importance.

Another possible field of research likely to be of importance in my area relates to the problem of control of the phreatophytes, the "water loving" plants. One type of these plants, the salt cedar, has spread through the Pecos River Valley, choking the water channels and

virtually guzzling the flow of the river. It is estimated that unless these plants are checked, before the end of this century, they will be consuming the whole flow of the Pecos River.

I am pleased to be associated with the distinguished senior Senator from New Mexico [Mr. ANDERSON] in the sponsorship of a bill aimed at controlling that particular problem. However, his leadership in connection with the pending bill is even more to be commended, for through the research started under this bill it may be possible to discover a simpler and more economical way to prevent nonbeneficial water use by such plants.

The plan of this bill is good. It will allow the establishment of a water resource research center in each State, at a land-grant college or State university. That is the pattern which was followed in establishing our agricultural research stations, back in 1887. Let us all hope for the same result; namely, that such research, when applied to water problems, will produce in our water supply the same abundance that agricultural research has produced in our food supply. Such research centers can provide the necessary concentration of efforts and talent, especially in encouraging the training of more specialists in water problems. It is not enough to spend millions of dollars for research. Centers where students will be attracted to acquire specialized knowledge and advanced training in water studies are also necessary. At the same time, title II insures that research will continue to be done at other institutions where there are interest and capability in contributing to knowledge of our Nation's water resources.

The cost of these programs is very, very modest, when we compare it with what we spend each year for the construction of new facilities. In Texas, the study completed last year by the U.S. Study Commission recommended the construction of 30 major new reservoirs before 1975, to meet our needs. The cost of these reservoirs alone will be \$563 million. Is it too much to hope that research will find a way to reduce the needed costs by 1 or 2 percent? If that happens, certainly the modest investment we make today will be one of the soundest investments it is possible to make.

I yield the floor, Mr. President.

Mr. MANSFIELD. Mr. President, the pending bill is S. 2 to establish water resources research centers at colleges and universities, and to promote a more adequate Federal program in the water research field. The bill was introduced by the distinguished senior Senator from New Mexico [Mr. ANDERSON].

On May 20, a group of national conservation organizations will hold a dinner to honor Senator ANDERSON for his continuing national leadership in the conservation field. During his many years of service, he has promoted many efforts to achieve more adequate forest programs, public land programs, soil conservation programs, programs for the development of the mining industry, recreation, wilderness—in fact, every type

of conservation of both natural resources and human resources.

Mr. KUCHEL. Mr. President, at this point will the Senator from Montana yield to me?

The PRESIDING OFFICER (Mr. RIBICOFF in the chair). Does the Senator from Montana yield to the Senator from California?

Mr. MANSFIELD. I yield.

Mr. KUCHEL. Mr. President, I believe I would be recreant in the performance of my duty if I did not take this occasion, as the distinguished majority leader comments upon one of our colleagues, the senior Senator from New Mexico [Mr. ANDERSON], to say that I completely agree with the Senator's characterization of a very great American, a very distinguished citizen of his own State, and one who has served his government both in the executive branch and now, with supreme distinction, here in the legislative Halls.

I look on CLINTON ANDERSON—if I may say this to my friend—as one of the giants in U.S. Government. I call him my friend, and I am honored to do so.

I have been a member of the Senate Committee on Interior and Insular Affairs for 11 years—during all the years that I have been permitted by the people of my State to be a Member of the Senate, I have enjoyed my work on that committee. From time to time I have brought to the committee matters of great interest to the people of my State. I have never failed to receive full and sympathetic consideration by Senator ANDERSON—and, I may add, on many occasions, full and enthusiastic approval and assistance.

So, Mr. President, as the distinguished Democratic leader rises to pay tribute to one of our colleagues, I am grateful that he has accorded me—sitting here on the other side of the aisle—an opportunity to join him in this deserved tribute to a fine Senator, and one whom I am proud to know as a friend.

Mr. YARBOROUGH. Mr. President, will the distinguished majority leader yield to me?

Mr. MANSFIELD. Certainly.

But, Mr. President, first let me say that I agree completely with what the distinguished acting minority leader [Mr. KUCHEL] has said about the Senator from New Mexico; and I hazard the estimate that the remarks of the Senator from California would be echoed by the other 98 Members of the Senate.

I am glad to yield to the Senator from Texas.

Mr. YARBOROUGH. Mr. President, I desire to say that I concur completely in what the distinguished majority leader and the distinguished minority whip have said about the former chairman of the Committee on Interior and Insular Affairs, the senior Senator from New Mexico [Mr. ANDERSON].

Those of us who live in a neighboring State feel we know him even better than do the Senator from Montana and the Senator from California.

Because of the problems which develop between States, perhaps those who live in a neighboring State are not always the best judges of the true worth of a

Senator from an adjoining State, inasmuch as sometimes the interests of the two States conflict. But that is not true in this case. The people of my State honor and congratulate the Senator from New Mexico for his leadership in these fields, including his leadership in connection with Senate bill 2 and other bills which already have been before the Senate and have been passed by the Senate.

The Senator from New Mexico is a distinguished leader. His service as a Cabinet officer, before he became the chairman of this committee, was also of great value to the Nation. Because of his service as Secretary of Agriculture, he has outstanding knowledge of the problems of land, water, and air, and the chemical relationship between them, and also of water, its effect on the land, and the effect of environment on human beings.

So it is a great pleasure to me to state, on behalf of the 10 million people of my State, our profound regard for this distinguished leader of a most important Senate committee.

I thank the distinguished majority leader for yielding to me.

Mr. MANSFIELD. Mr. President, I join the distinguished senior Senator from Texas [Mr. YARBOROUGH] in what he has just said. Both he and the Senator from California [Mr. KUCHEL] serve as members of the Committee on Interior and Insular Affairs. In that assignment they are in a position to see at first hand what magnificent contributions the Senator from New Mexico has made.

Parenthetically, if we in this body have made much of a record to date, it has been because of the efforts of the distinguished Senator from New Mexico and the committee of which he is chairman.

Mr. ANDERSON. Mr. President, will the Senator yield?

Mr. MANSFIELD. I yield.

Mr. ANDERSON. What we have heard sounds a little like the things that are said after a man dies. Many times I have said that I expect eventually to be dead and buried, but I would like those events to happen in that order, if possible.

The statement made by the Senator from California [Mr. KUCHEL] was one of the kindest things that have been said in a long time.

I greatly appreciate his statement, because of his position on the Committee on Interior and Insular Affairs. No man ever worked with a finer colleague than the distinguished minority whip, the able Senator from California.

I wish to say to my good friend the Senator from Texas that it is difficult to live as close to the Texans as we do without occasionally having some differences with them. But one of the principal reasons we have gotten along so well is the great spirit of tolerance on the part of the senior Senator from Texas, which I have appreciated. I have long enjoyed his confidence. I sincerely appreciate the kind words he has said about his State, which I love almost as dearly as he does.

Mr. MANSFIELD. For the edification of the distinguished senior Senator from

New Mexico, I observe that prior to my obtaining the floor, the senior Senator from Texas [Mr. YARBOROUGH] called attention to the activities of the Senator from New Mexico in regard to, I believe, the salt cedar problem which affects both States, and he did so in a very enthusiastic manner.

As the Senate starts consideration of the third conservation measure sponsored by Senator ANDERSON at this early date in its present session, I want to pay my personal tribute to him.

The Senate passed a bill to make the Bureau of Outdoor Recreation a fully useful, functioning agency. This bill is an outgrowth of the report of the Outdoor Recreation Resources Review Commission which the Senator from New Mexico successfully sponsored in legislation passed in 1958.

The Senate also passed this year, by an overwhelming 73 to 12 vote, a wilderness preservation bill to establish, for the first time in world history, a national reserve of lands to be maintained in their primitive condition for recreational, educational, and scientific values—a measure which reflects the great vision of the Senator from New Mexico as well as other Senators, like my associate, the Senator from Minnesota [Mr. HUMPHREY], who have long sponsored it.

The fact that S. 2, the water resources bill, is his third major measure on the floor this session is not only significant of Senator ANDERSON's energy; it is significant of a timeliness greatly appreciated by the leadership of the Senate. It is an example we may all appreciate more later in the year.

Senator ANDERSON was a member of the Select Committee on National Water Resources which reported to the Senate in 1961 that we should conduct an expanded, coordinated Federal water resources research program, and that we should prepare plans for optimum development of our great river basins by 1970.

The report did not recommend specific legislation. It stated:

The committee hopes that appropriate legislation to implement these recommendations will be introduced in the Senate and considered by the appropriate legislative committee.

Our colleague from New Mexico does not believe that expensive and arduous studies and research jobs should be printed and the reports allowed to gather dust on shelves.

He believes that they should be implemented and that the studies as well as the river basins should yield optimum benefits.

Since the select committee report was filed, Senator ANDERSON has labored persistently on preparing, introducing, holding hearings, and passing legislation needed to implement it.

Every Member of the Senate is indebted to CLINT ANDERSON for the energy he has given and the leadership he has provided in this body in the conservation field.

Late last year he took the basin act establishing the agricultural experiment stations—which he once directed as Secretary of Agriculture—and converted that long-tested and highly successful

measure from an agricultural act to a water resources research act.

As a consequence, he solved the delicate problems of the relationships in a cooperative Federal-State program by simply adopting the pattern of relationships developed in a long-established program over a period of 75 years.

The agricultural research program had its difficulties near the end of the 19th century. The State education institutions did not want Federal dictation. The Federal agencies did not want to dictate, but they wanted to weld the State stations into a coordinated program working on fundamental as well as local problems.

By conferences, give-and-take, they did work out a program which substituted Federal influence for Federal coercion, cooperation for conflict, and—as the Senator from New Mexico and Secretary of Agriculture Orville Freeman well know—agricultural surpluses for scarcity.

The pattern on which S. 2 has been built by the Senator from New Mexico assures its success, in my judgment.

Senator ANDERSON offered his first draft of S. 2 last July. He got departmental reports, and the comments of colleges, universities, State and local officials—in fact, from everyone who had views to express. He then redrafted the first bill into S. 2, the measure now before us, reported by the Interior and Insular Affairs Committee without dissent.

I express to the distinguished Senator, for myself and, I am sure, all other Senators, a sense of deep appreciation for the tireless and effective work he has done in bringing to the Senate this third major conservation bill this year.

I am delighted that conservation groups are going to honor him for his leadership in the conservation field. He richly deserves every honor given him.

Mr. ANDERSON. Mr. President, will the Senator yield?

Mr. MANSFIELD. I yield.

Mr. ANDERSON. I hope the able Senator from Montana will not forget that all this work is really a product of Senate Resolution 48, which was submitted by the able Senator from Montana, and in which many of us joined. The resolution established a Select Committee on Water Resources. The Senator from Montana, with his usual modesty, declined to be chairman of the committee. Since it was his resolution, he had a right to be chairman of that committee if he had so desired. He turned over the chairmanship to our late great friend Senator Robert Kerr of Oklahoma, who did a magnificent job in connection with that subject.

I do not desire that the RECORD on the subject should terminate without Senators being reminded again that the able Senator from Montana conceived the idea and broached it to a conference of western Senators. The western Senators thought highly of the idea. The proposal brought to the floor through a resolution, which was adopted by the Senate.

It was a fine piece of work. I am sure that when the Senator from Montana

stops and thinks about his work, he will recognize that one of the ablest things which he has done was his sponsorship of the resolution relating to water resources, which I think has called attention to a great many serious problems and made it possible for many of us to contribute some effective work in that field.

Mr. MANSFIELD. Mr. President, I thank the Senator for his kind remarks. I assure him that the reports of the committee and subsequent measures brought to the Senate after that committee had disbanded have more than justified my hopes and the interest which I showed in the beginning.

Mr. ANDERSON. Mr. President, the pending business of the Senate is S. 2, the water resources research bill, on which I am honored to have 22 cosponsors from both political parties.

S. 2 has a history dating back into the 86th Congress, when a group of us, at the suggestion of the distinguished majority leader of the Senate [Mr. MANSFIELD], on April 20, 1959, submitted Senate Resolution 48 to establish a Select Committee on National Water Resources.

The resolution was agreed to and a select committee was chosen from among the ranking members of the Committees on Interior and Insular Affairs, Agriculture and Forestry, Public Works and Commerce.

The late Robert S. Kerr, of Oklahoma, was chairman of the select committee. The distinguished assistant leader of the minority [Mr. KUCHEL] was vice chairman. Chairman Dennis Chavez, of the Public Works Committee, Chairman ALLEN ELLENDER, of the Agriculture and Forestry Committee, and Chairman WARREN MAGNUSON, of the Commerce Committee, served as members, while the late James E. Murray, of Montana, then chairman of the Interior and Insular Affairs Committee, was an ex officio member.

It was a distinguished committee. Under the leadership of Robert S. Kerr, it did a distinguished job. Hearings were held from ocean to ocean, and from the Great Lakes States to the Gulf of Mexico giving the committee a firsthand understanding of the variation of water problems in nearly every State in the Nation.

Outstanding students of water problems in and out of Government contributed to a series of 32 committee prints, or studies. Water resources were inventoried. The Nation's needs to the year 1980 and the year 2000 were projected for agriculture, industry, municipal and domestic water supply, recreation, fish and wildlife, dilution of wastes of all kinds, navigation, generation of power—every conceivable use.

The first, region-by-region, basin-by-basin, nationwide demand-supply projections were made. These studies demonstrated conclusively that we have entered a period in which serious supply problems are going to spread across the country, from the Southwest to the Great Lakes basins and the Hudson-Delaware region by the year 2000.

We are today using 25 percent of total water runoff to meet our needs. By the year 2000 with medium population growth we will require a supply equal to 75 percent of annual runoff. It would be no great problem if the water fell where the people live and if each of us—like Joe Bflpsk in the Little Abner cartoon strip—had a private cloud that followed us about and provided us with water. But clouds do not follow people. And rainfall is not timed to come when it is needed.

So the Council for Science and Technology, interpreting the select committee report, tells us:

To obtain, as an assured supply, such a large fraction of the total runoff would require structures for storage, regulation, transportation, and distribution that would be far more expensive, in proportion to present structures for this purpose, than the proportionate increase in the amount of withdrawal.

If surface storage were used, the required storage sites would intrude on areas already intensively occupied or needed for urban and industrial development.

The total capital cost would be several hundred billion dollars and annual charges would be of the order of tens of billions.

Technological and economic developments leading to marked reductions in future requirements for water withdrawals, to lowering the unit cost of water structures, and to greater utilization of underground storage are clearly desirable. Otherwise, both the economic and social costs of meeting future water needs will be painfully high.

In face of this sort of situation, the Select Committee on Water Resources agreed that one necessary part of a national water program is accelerated research into every possibility of conserving water, stopping evaporation from reservoirs, reducing or stopping losses in transport of water, reducing cost of water facilities of all kinds, use of underground storage, waste water salvage, recycling and reuse of available supply, desalting saline and brackish water, weather modification, elimination of water-loving plants along watercourses and reservoirs—everything that might stretch or increase our water supplies.

We believed, as does the Task Force of the Council for Science and Technology, that water problems can be solved and billions of dollars saved by a relatively small investment in research.

The science task group said:

Research in recent years has led to spectacular savings in construction and operating costs and to provision of structures and facilities that function more efficiently and have a longer effective life. But opportunities and needs for further research-induced economies and other benefits are now greater than ever. Expanding scientific knowledge, improved instruments for measuring and transmitting data, electronic computers for collating and analyzing data, and other technological advances have enhanced opportunities for even greater research gains than have previously existed and, thereby, for comparatively revolutionary advances in the tools and techniques of water resources development.

I happen to believe that the prediction of increasingly great research benefits are correct.

There is some evidence that in areas where provision of storage is essential

so high seasonal flows can be stored and held until needed, that it may be feasible to create great underground caverns with high yield nuclear explosions at about one-third the cost of providing surface storage in reservoirs. This would also eliminate the problem of flooding land.

This will take a great deal of research. The geologists are going to have to determine the behavior of various kinds of rock under the intense pressures of a 10-megaton explosion, so the results of such shots can be forecast with some accuracy. We will need to know in advance the size of explosion needed to match capacity requirements, and whether the underground bottle will leak. It is going to take the work of engineers and economists to determine the feasibility of and best location of such storage and pumping projects.

Mr. President, at the present time a most interesting study is being made of testing this possibility of storing water in what is termed an underground bottle. The loss by evaporation in a large reservoir is surprisingly high. Several people, including a very successful businessman in the State of Texas, have suggested the use of such a bottle, using a nuclear explosion to blow out a hole in the ground.

I had the privilege of discussing this proposal with Robert Kleberg, of the King Ranch, a short time ago in San Antonio. He presented information which indicated he had given the proposal substantial study. I transmitted his suggestion to the Atomic Energy Commission and to the Department of the Interior. I look forward to the study being made.

I am not able to say that this will be a successful method of storing water. I can only say that it is a very promising method for the storage of water, which has been brought about as a result of studies made in Nevada, when the results of tests on nuclear projects were reviewed.

With greater knowledge of the basic nature of water and of the physics of the earth's atmosphere, many of us believe that weather modification will be possible, and greater yields of usable rainfall obtained from the sky in water-short areas. There is a bill before the Committee on Commerce to speed experimentation in this field, and particularly to test the practicality of cloud seeding, which is a considerably debated matter. Studies are also underway of the possibility of coaxing rain-producing storms, which move across the Nation from west to east, to make their journey a little farther south, or north, to cross areas where water is needed the most.

A breakthrough in the desalinization of water may come out of research into methods of producing large quantities of low cost energy, or heat—a major ingredient in the desalinization process. Such breakthroughs, combined with water conserving practices, improved methods of storing and transporting water, and of purification and recycling, can provide abundant water for our children and grandchildren at reasonable economic costs. But it will come about, in the opinion of every committee, com-

mission, and task group which has studied water problems in the past decade or two, only if we greatly intensify research and the development of a much larger staff of hydroscientists.

There were 10 Democrats and 6 Republican members of the Senate Select Committee on National Water Resources, which recommended an expanded, comprehensive Federal water research program. Six members from each party joined in the majority report. Then we had minority views, which is not unusual. These particular minority views were a little out of the usual pattern, however, because they did not disagree with the majority. They simply contended, in effect, that the majority recommendations were unrealistically conservative, and that we need to move on our water problems with greater speed and more ambitious programs than the majority had indicated.

Certainly, we have no time to lose. Serious water problems are already upon us. This Congress—the 88th—is going to have to deal with the high salinity of water delivered to Mexico from the Colorado River Basin; with water supply for California and Arizona; with Chicago's need for more waste dilution water from the Great Lakes; with development of projects in the Delaware river basin and planning of the Susquehanna to help our great eastern industrial area supply itself, and a great many lesser water problems.

I have previously made two statements of the content, purposes, and rationale of S. 2.

In the CONGRESSIONAL RECORD for January 14, at page 185, will be found my statement upon introduction of S. 2. It includes excerpts from previous remarks on S. 3579, the bill which was introduced in 1962 and was the basis for getting departmental views and making detailed study of the proposal.

The report on S. 2 that is on each Member's desk brings up to date the background of the measure and provides a section-by-section analysis of the measure as it comes before the Senate.

S. 2 is an effort to combine research and training of needed hydroscientists. It would activate, in the water resource field, an alliance between operating agencies and educational institutions which has been strongly recommended by the National Academy of Sciences, the Council for Science and Technology, educators, and officials.

It would begin to implement the recommendations of the Select Committee on National Water Resources in the research field by establishing a research program patterned after the Agricultural Research and Experiment Station program. That program was established by the Hatch Act of 1877. It has been operating for 75 years and is an outstanding success.

We are fortunate to be able to adapt from this long-tested program a pattern for one of our water research efforts.

Mr. President, there has been no opposition to S. 2 within the Interior and Insular Affairs Committee. Hearings were held on it February 19 and 20. The committee had probably the most dis-

tinguished group of witnesses which has appeared before it in recent years. A panel composed of four State university presidents and the dean of engineering at Utah State University presented an organized case for the bill. The Interstate Conference on Water Problems of the Council of State Governments supported it. A number of scientists in the water field came to Washington to add their endorsement, including Dr. Arthur Maas of Harvard University, Omer J. Kelley, of the Stanford Research Institute in California, Dr. W. S. Bailey, of the Graduate School at Auburn University, Drs. Milton E. Muelder and L. L. Quill, of Michigan State University, and Dr. Irving Fox, of Resources for the Future.

Numerous organizations appeared in support of the bill including the National Association of Soil and Water Conservation District Officials, the National Reclamation Association, the American Farm Bureau, the Izaak Walton League, the National Wildlife Federation, and last, but far from least, the National League of Women Voters, which is a group of very effective ladies who have made water and water resources the subject of nationwide study.

A number of Senators appeared for the legislation, and I am especially pleased that this included the distinguished Senator from Nebraska [Mr. HRUSKA], who also gave the bill his endorsement in an address on the floor; Senator FONG, of Hawaii, where there is an abundance of salt water but no surplus of fresh water supplies, and Senator GRUENING, Senator MCGEE, Senator BIBLE, Senator ENGLE, Senator HART, and Senator MORSE.

This is bipartisan legislation, Mr. President, which I trust will pass this body with an impressive majority.

Mr. ALLOTT. Mr. President, I rise to support the objectives and purposes which S. 2 seeks to achieve. The importance of water to our society cannot be overemphasized. Those of us who live in the West are particularly conscious of this precious commodity, and the history of the Western States will surely reflect more wars over water than any other commodity.

In Colorado, water is a vital commodity, and a scarce one as well. Where it is available, it has turned arid plains on the eastern slope into productive soil. My home in Lamar is on the eastern slope. I have lived through the droughts of the thirties and the fifties; and still carry with me memories of dry, parched soil, precious topsoil blowing away—all for lack of water. A dust bowl is not a pleasant sight.

As a practicing attorney, I have represented ditch companies and water companies over a long period of time—in fact, about a quarter of a century—and I think I know the intrinsic value of water. I have also represented many farmers and know, from their point of view, what it means to have an adjudicated right to the beneficial use of water.

In fact, I would be inclined to say, with respect to this particular bill, that there is no such thing as a water problem. There are thousands of water

problems. If we approach this matter from any other point of view, we are showing a complete lack of regard for the complexities and the kind of problems we are discussing.

Water is a scarce commodity in Colorado on the eastern and western slopes. There simply is an insufficient quantity to meet all the recognized needs. Nor is the problem confined to any one State. It exists in many. Any program which attempts to deal with this deserves to be supported. There is a real need, in my judgment, not only to look to the requirements today, but to plan for the increasing demands ahead. Dr. W. E. Morgan, president of Colorado State University and chairman of the Water Resources Committee of the Association of State Universities and Land-Grant Colleges, pointed up the problem in his testimony before our committee, supporting S. 2. He said:

Every activity of man, every facet of industry, leaves its influence on the water resource. Water, like sunshine and air, is fundamental to life itself, and the right of the individual to enjoy unpolluted water necessary for the essentials of life and health is today more than just a license. Water is a major concern of civilized society. The story of water is the story of man. As every informed person knows, the demands upon the water resource are rapidly multiplying, and, in an area embracing nearly one-third of the United States, 1980 demands will exceed the supply.

Mr. President, just a few moments ago the distinguished author of this bill [Mr. ANDERSON] enumerated a few of the water problems which we face. I said a few moments ago that there is no such thing as a water problem—that there are thousands of water problems. I think that is an accurate statement.

I should like to cite just one small example to show how this problem can become complicated. Let us consider the use of irrigation water, for example, for a given crop. Assuming the crop is wheat, or alfalfa, or sorghum, or milo, or maize, the application of water upon a given crop in one community may require a completely different sort of approach and type of use than the water would take in another community in the same State. This fact is governed by the altitude, it is governed by the winds, it is governed by the topography, it is governed by the type of soil and land upon which the crop is planted. So that even in the farming and watering of a given crop in just one State, there can be as many as 50 or 60 problems with respect to it.

We have the problem of increasing salinity. In the Arkansas River, in my own State, there are cities in which the people are drinking water which is as bad as we are told is the water we are exporting to Old Mexico. So we have the problem of salinity with respect to producing fresh water from salt or brackish water. We have the problem of producing fresh water under treaties with other countries, such as with Mexico.

We have the problems of conserving our water, and conserving it behind high dams and in high places in the mountains. That was one of the things that gave me the greatest trouble about the

wilderness bill which we passed recently, because the best and most logical place for water storage is not in the low reaches of a river, but in the high reaches of the mountains. That is where we get effective flood control, and that is where we get effective water storage.

Therefore we have to consider the matter of water erosion in connection with this subject. If we do not have control of that, of course, we lose land. Then, once having started to lose land, we lose more land by reason of wind.

There is literally no end to the separate and different problems involved in water research and our total water effort.

Water research is now being carried on, not only in the Department of Interior, which would have the responsibility for implementing S. 2, but is the subject of research by many departments and agencies of Government. The Federal Council for Science and Technology in its report to the President on water resources research, dated February 11, 1963, indicates that:

At present, five major departments—Agriculture, Commerce, Defense, Health, Education, and Welfare, and Interior, as well as three independent agencies—Atomic Energy Commission, National Science Foundation, and Tennessee Valley Authority—conduct or support research programs in one or more fields, related to water resources.

In addition to this, it is safe to say that almost every land-grant college in the Nation conducts some research into water use. In the West they are performing a great amount of research into this effort.

It becomes important, then, to understand the nature and extent of research now being undertaken. Again referring to the report of the Federal Council for Science and Technology, I quote from page 44:

DEPARTMENT OF AGRICULTURE

The Department of Agriculture has interests and statutory responsibilities that comprehend almost every aspect of water.

The Department's responsibility in the effective use of water is evident when one considers some of the data on water use and management. The average annual precipitation on the 48 conterminous States is 4.75 billion acre-feet. The first impact of this primary water supply is on the surface of the land. The nature of vegetative cover, slope, soil characteristics, cropping patterns, and conservation practices influences whether precipitation becomes direct surface runoff, rapid subsurface flow (subsurface storm flow), deep percolation (ground water recharge), or soil moisture for evapotranspiration. About 70 percent of this total water supply presently is consumed by evapotranspiration. The remainder, about 1½ billion acre-feet per year, constitutes the water supply presently available to the Nation for all other purposes. And, of the portion of this water that is consumptively used as a result of man's activities, about 90 percent is used by irrigation agriculture.

Authorized operational programs of the Department, carried out through nine different agencies, include (1) technical and other assistance to soil-conservation districts and individual farmers in planning and installing soil- and water-conservation programs, (2) cost-sharing assistance to farmers for specified soil- and water-conservation practices; (3) loans to individuals and water-use associations for water facilities, irrigation

improvements, rural waste-disposal systems, soil and water conservation and erosion prevention, and related measures; (4) assistance to local sponsors of resource conservation and development projects; (5) assistance on rural-renewal projects; (6) planning and financial assistance and loans to local watershed organizations in planning and carrying out works of improvement for flood prevention and damage abatement, irrigation and drainage, fish, wildlife, and recreation development, and municipal and industrial water supply; (7) participation in cooperative State and private forestry programs, and management, protection, and development and proper use of the 186 million acres, in the national forests and grasslands; (8) credit and other assistance to organizations furnishing electric energy to persons in rural areas, among other things to finance construction of steam and hydroelectric generating plants; and (9) participation in comprehensive river-basin development activities.

How land in farms and forest, and rangeland not in farms, are managed has a tremendous impact on the potential yield and use of water. The close association in the Department between research and action in land and water use is of great importance. Each serves the other. Action programs in the Department of Agriculture dealing with more than three-fourths of the land area in the United States are principal users—often the first users—of research results.

The Department of Agriculture has broad authority to engage in research as it bears on agriculture and the programs administered by the Department. The Department may engage in research (1) directly through its own facilities and personnel; (2) through the State Agricultural Experiment Stations both by cooperation and through grants; and (3) through research grants and contracts with nonprofit institutions of higher education and other such organizations engaged in scientific research. The following agencies have water-resources research programs that are considered in this report: Agricultural Research Service, Cooperative State Experiment Station Service, Economic Research Service, Forest Service, and Soil Conservation Service.

These programs include basic research in the natural, physical, social, and engineering sciences underlying water research. Applied-research programs include research on soil and water management, on costs and benefits of water-related programs of this and other executive agencies, and on institutional factors affecting water use.

DEPARTMENT OF COMMERCE

Department of Commerce agencies having statutory responsibilities entailing water-resources research include the Weather Bureau, Bureau of Public Roads, Coast and Geodetic Survey, Maritime Administration, and Business and Defense Services Administration.

The primary mission of the Weather Bureau is to provide a national service for reporting weather and climate—including precipitation, evaporation, and river stages—and for issuing forecasts and warnings of weather and river conditions affecting the Nation's safety and economic welfare. The reliability of prediction is a true test of knowledge; conversely, erroneous forecasts signify a need for research. Thus, the Bureau has found it necessary to pursue major research programs involving the evaluation and prediction of water movement in all phases of the hydrologic cycle. The agency would also probably have a major responsibility for operational aspects of Federal programs in weather modification, if it becomes feasible, which necessitates a research program in this field. The Weather Bureau receives a considerable portion of its funds for hydrometeorological observations and research by transfer from other agencies.

The Bureau of Public Roads is involved in water-resources research to the extent necessary to provide adequate protection of the highway system and highway traffic against damage by floods and other storm hazards.

The Coast and Geodetic Survey's research program in the field of water resources is largely concerned with the part played by the oceans in the hydrologic cycle. The agency's responsibilities lead it to have an interest in research on land settlement and displacement resulting from lowering of ground-water levels, erosion and sedimentation in coastal areas, estuarine oceanography and coastal engineering, measurement and prediction of tides, and problems of movement of the earth's crust. Part of the Coast and Geodetic Survey's research programs on water is funded and dealt with in connection with the Federal program for oceanographic research.

The Maritime Administration includes among its statutory responsibilities certain missions that have a direct relationship to water-resources programs. Research work is sponsored in connection with development of information on salinity; pollution content of water; bottom relief and characteristics; tide characteristics, volume-discharge, and velocity of flow; flood stages and causes; current directions and velocities; and port development, industrial development along navigable waterways, and long-range planning associated with river and harbor improvements. The Maritime Administration was authorized to prepare for the operation of the atomic vessel *N.S. Savannah*. As a result, certain environmental surveys were or are being carried on by the Public Health Service, Corps of Engineers, Weather Bureau, Coast and Geodetic Survey, and Geological Survey with Maritime Administration and Atomic Energy Commission funds, relative to water circulation in harbors, harbor models, flocculating agents, salinity and pollution, and climatology of 60 selected ports; and to salt-water encroachment into fresh-water aquifers along the Delaware River.

Work of the Business and Defense Services Administration becomes involved with water-resources research in connection with the agency's objective of assisting in the development of the industry and commerce of the Nation. Since industrial growth depends in part of the adequacy of water supply, the Business and Defense Services Administration conducts selected research into the economic aspects of water-resources development and the development of methods for prediction of future trends of water use in relation to economic growth.

DEPARTMENT OF DEFENSE

The water resources program of the Corps of Engineers, Department of the Army, has been expanded gradually in nature and scope through a series of Rivers and Harbors and Flood Control Acts since its inception in 1824 by congressional action. It now encompasses a major part of the Federal activity in development of water and related land resources. The Corps of Engineers' civil works program comprises the planning, design, construction, and operation of multiple-purpose projects and systems of projects aimed at meeting the Nation's needs for better waterborne transportation; protection from storms and floods; development of hydroelectric power; conservation of water for domestic, industrial, and agricultural purposes; abatement of pollution through river-flow regulation; and shore erosion control. At the same time, its program is aimed at satisfying the growing needs for outdoor recreation and provides for the conservation and enhancement of fish and wildlife values. The Corps of Engineers also has regulatory functions in connection with navigable waters, is responsible for emergency flood fighting and rescue work,

and constructs and operates the water supply system of the Nation's Capital.

In support of these wide-ranging activities, the Corps of Engineers undertakes a comprehensive program of research and development directly oriented toward carrying out its responsibilities with maximum effectiveness and economy. Its research activities are aimed primarily at overcoming existing inadequacies of basic knowledge and development of practical techniques of basic techniques applicable to all aspects of civil works projects and project systems. Corps of Engineers research has heretofore pertained essentially to such technical fields as hydrology and hydraulics, soil mechanics and geology, structures and concrete, and electrical and mechanical equipment. There is now increasing realization that research on resources-oriented, engineering socioeconomic cannot be neglected without detriment to optimum water resources development. With the present emphasis on comprehensive, multiple-purpose, river basin system development (rather than single-purpose individual projects), the Corps of Engineers is interested in broad interdisciplinary research to provide a more intimate understanding of how to formulate and execute a well-balanced water resources program responsive to local and regional requirements and geared to national goals.

The Department of Defense conducts such other types of research and exploratory development related to water resources as are necessary in support of its military operational missions. For example, the Air Force is investigating weather-radar techniques, numerical weather prediction, and meteorological research to improve forecasting; research on basic mechanisms of clouds; and studies of improved methods of terrain assessment including water supply. Similarly, the Navy's research program in the field of water resources includes projects in meteorology, atmospheric physics, oceanography, geography, advanced-base facilities, and utilities and services. The Navy's work is supported by the Office of Naval Research, the Bureau of Yards and Docks, and the Marine Corps.

In the Army, water-related research has as its goal an increase in combat effectiveness. The Army's concern with meteorology stems from the sensitivity of its operations to current meteorological situations. Meteorological information must be ready on the spot, minute by minute. Hence, this capability must be organic to each individual Army unit. The meteorological requirements of the Army are varied and complex, ranging from the routine measurement of meteorological parameters through the computation and application of meteorological corrections for artillery fire, including the desirability of modifying weather conditions to make them more favorable for Army operations. The Army's research and development efforts on mobile weather radar are directed at improved forecasting and observation techniques for use on micrometeorological and mesometeorological scales. From the Army's trafficability and soil-mobility research may come a better understanding of the energy and water-flow systems that occur within the earth-atmosphere boundary environment. The Army Medical Service is responsible for the detection and qualitative analysis of chemical, biological, and radiological contaminants in water. It insures that water is properly treated and, in cooperation with the Corps of Engineers and the Army Material Command, makes studies and recommendations on the design, selection, and operation of water-purifying equipment. It conducts research and investigates new techniques and methods for determining the treatment and disposal of sanitary and industrial wastes. The Army Corps of Engineers has responsibility for supplying water to the Army in the field. Hence, research

and development are undertaken on processes and equipment for surface-water treatment and waste-water reuse, on improvements in water storage and distribution facilities compatible with new equipment for water production, on water decontamination, and on techniques and equipment for location and recovery of ground-water supplies. The Army maintains close contact with the Office of Saline Water to exploit the benefits of that Office's research. The Army's mission-related program of research in the field of snow, ice, and permafrost has contributed much to the advancement of knowledge in the water-resources field.

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

The Department of Health, Education, and Welfare has basic statutory responsibilities for water resources research under the Federal Water Pollution Control Act and the Public Health Service Act. It has responsibility to support and aid technical research related to the prevention and control of water pollution. The Public Health Service is directed to conduct, and to encourage others to conduct, research relating to disease and impairments of man, including among other subjects water purification, sewage treatment, and ameliorating pollution of lakes and streams. In carrying out its responsibilities, the Department is authorized to make available the results of research and demonstrations relating to the prevention and control of water pollution; to make grants-in-aid and contracts for research or training and demonstration projects; to provide training in pollution control to personnel of public agencies and other persons having suitable qualifications; and, upon the request of any State or interstate water pollution control agency, to conduct investigations and research and to make surveys concerning any specific problem of water pollution confronting any State, interstate agency, community, municipality, or industrial plant, with a view to recommending a solution for such problems.

The Department also has the responsibility, in cooperation with other Federal, State, and local agencies having related responsibilities, for collecting and disseminating basic data and other information on chemical, physical, and biological water quality in relation to water pollution and its prevention and control.

Furthermore, the Department is directed to conduct research and to develop and demonstrate means of treating municipal sewage and other waterborne wastes to remove the maximum possible amounts of physical, chemical, and biological pollutants; and improved methods and procedures to identify and measure the effects on water quality and water uses of augmented streamflows designed to control water pollution not susceptible to other means of abatement.

To carry out these responsibilities, and promote the objectives of the Department, laboratories in addition to those already existing are to be established and maintained for research, investigations, experiments, field demonstrations and studies, and training relating to the prevention and control of water pollution. Location of such a facility in each of seven major geographic areas of the United States is specified. The law states also that the facilities should be located near institutions of higher learning in which graduate training in such research might be carried out.

Research and technical development work and studies with respect to the quality of the waters of the Great Lakes are also authorized.

Two water-quality-standards research laboratories, one for fresh water and one for salt water, are provided for by Congress in the Labor, Health, Education, and Welfare Appropriations Act of 1962.

The responsibilities of the Department for preparation and development of comprehensive programs for eliminating or reducing the pollution of the waters of the United States, and for planning for the inclusion of storage in Federal reservoirs for stream-flow regulation for water-quality control, also generate a need for research into ways of dealing with these subjects.

The basic authorities contained in the Public Health Service Act, as amended, also call for research sponsored by the Public Health Service, including research fellowships, and grants-in-aid to universities, hospitals, laboratories, and other public or private institutions, and to individuals, with particular reference to health and medical fields.

DEPARTMENT OF THE INTERIOR

The Department of the Interior is concerned with the study of water as a resource, with the use and control of water, with increasing water supplies from all sources while at the same time serving and developing multiple-purpose uses of existing supplies, with integrated systems of river basin and watershed development, with water in the environment of fish and wildlife, and with the economic and engineering aspects of water projects of many different kinds.

Legal authority for the Interior Department's water resources research is explicit or implicit in a large number of congressional enactments, some of which are specific to particular fields of research and some of which provide for water research very broadly. It is the only Department having authority for water resources research throughout the country without limitation or relationship to specific operational problems.

The Geological Survey carries out water resources research and data collection and interpretation pursuant to the objectives of its Organic Act of March 3, 1879, which directs the examination of the mineral resources and products of the national domain, and of subsequent legislation. Specific appropriations by Congress for gaging streams and performing other functions relating to water resources have been made annually since 1894.

While the systematic collection of stream-flow data that constituted the first direct water product of the arid lands work begun by the Survey in 1888 might not now be considered a research program, at the time it broke new ground in developing techniques and defining the resource, and led to the establishing of research programs in basic hydrology. The present research program of the Geological Survey includes study of water in all its forms, solid, liquid, and vapor, of its quantity and quality, and of its distribution in time and in place. It carries out its research with funds provided by Congress—matched, for large segments of its work, with funds provided by the States. Federal water resources research funds expended by the Geological Survey are augmented by State cooperative funds to the extent of about \$3.5 million and \$4.3 million for 1963 and 1964 fiscal years, respectively. These sums are not included in the totals shown in the tables in chapters 4 and 5. The Survey has no construction or operational responsibilities; its research programs therefore are not aimed at any particular operational program, although they produce information that lies at the foundation of all plans for the improvement of water use and control. The Survey through its broad-gage studies of geology and physiography and its particular experience and personnel makeup in water studies is especially qualified for research on water occurrence and movement in broad hydrologic systems—ground water reservoirs and related surface water bodies—

and on the effect of man's activities on these systems and the principles governing their practical development and control.

Over the years, missions of the Department of the Interior have been enlarged to cover many other fields of basic and applied research in water. The Bureau of Land Management carries out research programs in some of the same fields as the Department of Agriculture, in order to discharge effectively its responsibilities for management of more than 467 million acres of public lands. Better means are needed to provide adequate water for the many beneficial uses of these public lands, and to prevent waste and assure conservative use. The development of adapted plant species that utilize water more efficiently than do the most prevalent native species is of importance, as well as the establishment of practical means of vegetative conversion to these superior plants. There is also need for more effective practices in eliminating or reducing the discharge of soil-erosional and other pollutants from public lands, and operations located thereon, to streams and water-storage facilities.

The Bureau of Reclamation was established for the reclamation of arid lands in the West. The early reclamation projects were constructed without sufficient research, and as a result some of the first settlers on reclamation projects experienced severe economic hardships, and several projects had to be abandoned. As the agency gained more experience, mistakes were corrected, and research programs were established to develop the basis for successful reclamation. The Bureau of Reclamation now conducts important research in matters concerning streamflow regulation, water-quality control, evaporation and seepage reduction, and other means of increasing efficiency of irrigation; induced precipitation; control of sedimentation; and economic and other aspects of multiple-purpose river-basin development.

The Bureau of Indian Affairs, having responsibilities for irrigation of Indian lands, is concerned with some of the same problems as the Bureau of Reclamation in the field of water resources. In discharging its responsibilities for the management and protection of watersheds on Indian reservations, the Indian Bureau is concerned also with many of the same problems as the Bureau of Land Management and the Department of Agriculture.

The statutory responsibility of the National Park Service for protection and regulation of national parks and monuments has led the agency to be concerned with research in various aspects of water resources in relation to recreational pursuits.

The Bureau of Mines is concerned with water-resources research because of its primary mission to assure that the Nation has a supply of usable minerals to meet its needs in war and peace. This calls for the prevention or reduction of the waste of mineral resources. Since water is one of the primary raw materials required by the mineral industry, research in the fields of water use, water quality, and water supply are of concern to the Bureau of Mines. Its activities are related to problems of the mineral industry and the national interest in utilization of mineral resources, taking advantage of appropriate research accomplished by others.

The Office of Saline Water was established by the Department of the Interior to carry out the responsibilities placed in the Department by the act of July 3, 1952, as amended June 29, 1955, and September 22, 1961. The primary objective of this legislation is the development of low-cost means for the large-scale production of potable water from saline water, and for studies and

research related thereto. The exercise of this responsibility has necessitated the establishment of major water-research programs on an expanding scale.

The Fish and Wildlife Service, composed of the Bureau of Commercial Fisheries and the Bureau of Sport Fisheries and Wildlife, was established to conserve the Nation's fish and wildlife resources. It has responsibilities for the study and protection of the fish and shellfish that inhabit the seas bordering our shores, the fish that inhabit the inland waters, and the wildlife that is part of our natural heritage. To exercise these responsibilities, the Service must be concerned with water resources, and has many programs that deal indirectly with water. To understand the life histories of these animals we must know how water influences their development, how pollution affects their existence, and how manmade changes affect their environment.

Specifically, the Secretary of the Interior, through the Fish and Wildlife Service and the Bureau of Mines, is authorized to make such investigations as he deems necessary to determine the effects on wildlife of domestic sewage; mine, petroleum, and industrial wastes; sediment resulting from erosion; and other polluting substances.

ATOMIC ENERGY COMMISSION

By the Atomic Energy Act of 1954 and subsequent enactments, the Atomic Energy Commission is charged with the responsibility for the development, use, and control of atomic energy in such a way as to make the maximum contribution to the general welfare, defense, and security of the Nation. Specifically, the Atomic Energy Commission is directed to conduct research and development and training activities in or related to nuclear processes, theory and production of atomic energy, utilization of nuclear and radioactive materials, and protection of public health and safety in all nuclear activities. The Atomic Energy Commission is authorized also to make research and development studies in military applications of atomic energy, which also affect water resources.

Activities in the Atomic Energy Commission with respect to the control and disposal of radioactive materials have led to intensive environmental studies involving radioactivity and its effect on ground and surface waters. In connection with the application of atomic energy to improve the welfare of the Nation, the Atomic Energy Commission carries on research into the use of radioisotopes and nuclear techniques as tools for measurement and analysis, and into the development of economical power based on nuclear energy. The Atomic Energy Commission conducts research into ways of using atomic energy in attacking problems of water resources. Many of the Commission's research programs are carried on through transfer of funds to other Federal agencies, such as the Weather Bureau and the Geological Survey, that have primary responsibilities in the field. Similarly, the Atomic Energy Commission does work for other agencies in fields in which it has particular competence—for example, the work it is doing for the Department of the Interior in the field of desalination.

NATIONAL SCIENCE FOUNDATION

The National Science Foundation was created by the National Science Foundation Act of 1950 to promote the progress of science, to advance the national health, prosperity, and welfare, to help secure the national defense, and for other purposes.

The Foundation has the specific mission of strengthening the Nation's scientific-research potential. One of the ways in which

this is done is through a program of grants to stimulate basic research in all fields.

With respect to basic research, the Foundation considers all proposals, including those dealing with water-related research. Most proposals to the Foundation originate in or are sponsored by the various universities throughout the country. Because of the relatively small number of water proposals received by the Foundation, it has not been necessary or prudent to provide specialized staff assistance or a special program to handle them. Water proposals therefore go to one of several of the research programs (atmospheric sciences, earth sciences, etc.) where they compete for support with other research proposals. Except for the special field of weather modification, the Foundation has made no effort to channel funds to any one facet of water research.

Under legislation enacted July 11, 1958, the National Science Foundation has been given specific responsibility for initiation and support of a program of study, research, and evaluation in the field of weather modification. A large program of research in this field has been established in cooperation with the Weather Bureau, the Air Force, and other agencies. The weather-modification program of the Foundation supports a full range of theoretical studies and field research on the physics and chemistry of precipitation. The research is in

the main experimental and characterized by a long-term, fundamental approach. However, field tests and engineering studies are vigorously pursued when basic discoveries suggest that they will be rewarding.

TENNESSEE VALLEY AUTHORITY

The Tennessee Valley Authority's research responsibilities related to water resources center around the hydrologic and economic problems arising out of the water-control and resource-development functions vested in the Authority. The Authority was created to improve navigation in the Tennessee River and to control the destructive floodwaters in the Tennessee River and Mississippi River basins in the interest of agricultural and industrial development. It is authorized to construct dams and reservoirs in the Tennessee and its tributaries for purposes of navigation and flood control, to undertake cooperative activity for the prevention of soil erosion, and to regulate the streamflow, primarily for the purpose of promoting navigation and controlling floods. In addition, the Authority is empowered to make such studies and experiments as may be necessary and suitable to aid in the proper use, conservation, and development of the natural resources of the Tennessee River drainage basin and adjoining territory.

Mr. President, many difficult problems are involved. I shall not discuss them at

this time. Suffice it to say that some eight principal agencies of the Federal Government are already engaged in research in the field of water. The report of the Federal Council for Science and Technology, which I have just completed reading, affords a superficial albeit a good look at the work which is being done in this area by the various agencies of the Government.

The report shows further that during fiscal year 1963 the total programming on all phases of water research, exclusive of amounts reported separately to the Committee on Atmospheric Sciences and Oceanography amounts to \$66.327 million and that the total fiscal year 1964 budget calls for an increase of more than \$10 million, for a total of \$76.419 million. A total showing the breakdown on these figures by Department and Agency as well as by nature of the study appears at page 264 of the report.

Mr. President, I ask unanimous consent to have the table printed at this point in the Record.

There being no objection, the table was ordered to be printed in the Record, as follows:

Summary of 1963 program and 1964 budget for water-resources research																	
[Excludes amounts reported separately to Committees on Atmospheric Sciences and Oceanography; in thousands of dollars]																	
	Agriculture		Commerce		Defense ¹		Health, Education, and Welfare		Interior		Atomic Energy Commission		National Science Foundation		Tennessee Valley Authority		Total, 1963 program
	1963 program	1964 budget	1963 program	1964 budget	1963 program	1964 budget	1963 program	1964 budget	1963 program	1964 budget	1963 program	1964 budget	1963 program	1964 budget	1963 program	1964 budget	Total, 1964 budget
I. Nature of water.....	70	70	0	58	0	0	0	0	1,995	3,500	0	0	-----	-----	0	0	2,065
II. Water cycle:																	
A. General.....	0	0	5	30	0	0	0	0	203	373	0	0	-----	-----	0	0	208
B. Precipitation ²	514	499	322	353	168	172	0	0	213	218	0	0	-----	-----	43	43	1,260
C. Snow, ice, and permafrost.....	0	0	10	15	0	0	0	0	75	100	9	9	-----	-----	0	0	94
D. Evaporation and transpiration.....	749	769	35	65	4	3	0	0	784	849	0	0	-----	-----	11	5	1,583
E. Streams and lakes.....	398	398	52	102	112	110	0	0	1,720	2,444	0	0	-----	-----	224	209	2,506
F. Ground water and hydrogeology.....	102	102	0	0	4	3	0	0	5,304	6,495	645	475	-----	-----	0	0	6,065
G. Oceanic influences.....	30	30	5	15	0	0	0	0	50	100	0	0	-----	-----	0	0	85
H. Forecasting ³	214	214	449	519	0	0	0	0	10	33	0	0	-----	-----	7	0	680
Subtotal.....	2,007	2,012	878	1,099	288	288	0	0	8,359	10,612	654	484	-----	-----	285	257	12,471
III. Water and land management:																	
A. Water movement in soils.....	946	963	0	0	0	0	229	307	15	25	0	0	-----	-----	0	0	1,190
B. Water and plants.....	775	803	0	0	0	0	14	18	40	90	0	0	-----	-----	0	0	829
C. Watershed protection.....	1,279	1,372	0	0	0	0	0	0	200	225	0	0	-----	-----	0	0	1,497
D. Water-yield improvement.....	902	1,098	0	0	0	0	0	0	46	16	0	0	-----	-----	0	0	1,038
E. Erosion and sedimentation.....	1,445	1,583	72	85	67	72	0	0	106	162	0	0	-----	-----	18	18	1,708
F. Upstream flood abatement.....	943	1,068	0	0	0	0	0	0	0	0	0	0	-----	-----	153	178	1,096
G. Irrigation.....	503	519	0	0	0	0	0	0	75	113	0	0	-----	-----	0	0	578
H. Drainage.....	519	529	0	0	0	0	0	0	2	2	0	0	-----	-----	0	0	521
Subtotal.....	7,402	7,935	72	85	67	72	243	325	484	633	0	0	-----	-----	171	196	8,439
IV. Development and control:																	
A. Water supply.....	114	114	0	0	0	0	0	0	310	351	0	0	-----	-----	9	0	424
B. Flood control (downstream).....	80	80	0	0	0	0	0	0	250	150	0	0	-----	-----	13	57	343
C. Hydropower.....	0	0	0	0	0	0	0	0	20	30	30	0	-----	-----	0	0	50
D. Navigation.....	0	0	464	750	0	0	0	0	0	0	0	0	-----	-----	5	0	469
E. Urban and industrial water-use problems.....	0	0	0	0	0	0	0	0	260	270	0	0	-----	-----	0	0	260
F. Recreation.....	30	32	0	0	0	0	0	0	13	7	0	0	-----	-----	10	10	53
G. Fish and wildlife.....	0	0	0	0	0	0	0	0	2,226	2,433	0	0	-----	-----	38	77	2,264
H. Estuarine oceanography.....	0	0	50	60	2	2	479	757	35	130	135	225	-----	-----	0	0	701
I. Coastal engineering.....	0	0	5	20	48	18	0	0	0	0	0	0	-----	-----	0	0	53
Subtotal.....	224	226	519	830	50	20	479	757	3,114	3,371	165	225	-----	-----	66	144	4,617
V. Qualitative aspects:																	
A. Characterization of wastes.....	60	60	0	0	0	0	438	493	1,237	1,900	0	0	-----	-----	0	0	1,735
B. Effects of pollution on water uses.....	0	0	50	50	0	0	643	1,007	506	989	0	0	-----	-----	28	43	1,227
C. Interactions of wastes.....	0	0	0	0	0	0	1,856	1,961	0	0	0	0	-----	-----	0	0	1,856
D. Disposal of waste effluents.....	15	16	0	10	0	0	251	259	0	2,055	2,109	175	-----	-----	0	0	2,321
E. Surface interactions.....	0	0	0	0	0	0	0	0	312	516	155	175	-----	-----	0	0	467
F. Effects of development on quality.....	0	0	0	0	0	0	496	574	0	0	0	0	-----	-----	6	26	502
G. Quality characteristics.....	0	0	0	0	0	0	0	0	655	820	0	0	-----	-----	92	147	747
H. Aqueous solutions.....	0	0	0	0	0	0	0	0	1,135	2,199	0	0	-----	-----	0	0	1,135
Subtotal.....	75	76	50	60	0	0	3,684	4,294	3,845	6,424	2,210	2,284	-----	-----	126	216	9,990

Footnotes at end of table.

Summary of 1963 program and 1964 budget for water-resources research—Continued

(Excludes amounts reported separately to Committees on Atmospheric Sciences and Oceanography; in thousands of dollars)

	Agriculture		Commerce		Defense ¹		Health, Education, and Welfare		Interior		Atomic Energy Commission		National Science Foundation		Tennessee Valley Authority		Total, 1963 program	Total, 1964 budget
	1963 program	1964 budget	1963 program	1964 budget	1963 program	1964 budget	1963 program	1964 budget	1963 program	1964 budget	1963 program	1964 budget	1963 program	1964 budget	1963 program	1964 budget		
VI. Reuse and separation:																		
A. Saline-water conversion.....	0	0	0	0	0	0	0	0	4,031	6,281	0	0	0	0	0	0	4,031	6,281
B. Advanced waste treatment.....	0	0	0	0	0	0	1,230	1,348	0	0	645	640	0	0	0	0	1,875	1,988
C. Improved treatment of wastes.....	15	15	0	0	0	0	827	880	0	0	0	0	0	0	0	0	842	895
D. Treatment of water.....	26	27	0	0	0	0	426	506	0	0	0	0	0	0	0	0	452	533
E. Use of water of impaired quality.....	411	413	0	0	0	0	60	79	0	0	0	0	0	0	0	0	471	492
Subtotal.....	452	455	0	0	0	0	2,543	2,813	4,031	6,281	645	640	0	0	0	0	7,671	10,189
VII. Economic and institutional aspects:																		
A. Role of water in growth.....	144	170	166	168	0	0	0	0	0	0	0	0	0	0	35	19	345	357
B. Economics of development and management.....	343	352	0	0	78	100	114	131	814	1,290	100	200	0	0	4	8	1,453	2,081
C. Economic analysis of institutions.....	103	106	0	0	0	0	0	0	64	70	0	0	0	0	0	0	167	176
D. Area appraisals.....	0	0	0	0	0	0	25	33	70	100	0	0	0	0	4	0	99	133
Subtotal.....	590	628	166	168	78	100	139	164	948	1,460	100	200	0	0	43	27	2,064	2,747
VIII. Engineering of systems:																		
A. Design.....	57	60	275	245	384	426	0	0	1,010	960	0	0	0	0	0	0	1,726	1,691
B. Materials.....	0	0	0	0	438	440	0	0	94	123	0	0	0	0	0	0	532	568
C. Construction, operation, and maintenance.....	0	0	0	0	1,076	2,460	0	0	508	639	0	0	0	0	0	0	1,584	3,099
Subtotal.....	57	60	275	245	1,898	3,326	0	0	1,612	1,727	0	0	0	0	0	0	3,842	5,358
IX. Manpower and research facilities:																		
A. Education and training.....	0	0	22	27	0	20	1,664	2,810	150	425	0	0	0	0	0	0	1,836	3,282
B. Research facilities.....	1,225	0	0	0	0	0	10,200	6,290	0	0	0	0	0	0	0	0	11,425	6,290
Subtotal.....	1,225	0	22	27	0	20	11,864	9,100	150	425	0	0	0	0	0	0	13,261	9,572
Undistributed grant program.....	0	0	0	0	0	0	0	0	0	0	0	0	1,907	2,000	0	0	1,907	2,000
Grand total.....	12,102	11,462	1,982	2,572	2,381	3,826	18,952	17,453	24,538	34,433	3,774	73,833	1,907	2,000	691	840	66,327	76,419

¹ Includes Corps of Engineers—civil functions only. Includes only the part of estuarine and coastal studies directly related to water resources; remainder of oceanographic work included in oceanography program.

² Grant program cannot be distributed among categories in advance.

³ Weather-modification program not included; it is included in atmospheric-sciences program.

⁴ Totals differ from figures of \$12,300,000 and \$11,700,000 printed in budget because of calculating-machine error of \$100,000 in each year, and of inadvertent inclusion of sums of \$140,000 and \$150,000 from subcategory IV-A that were already covered in other categories, in figures supplied to Budget Bureau.

⁵ Totals shown here differ from those printed in budget because of redefinition of research content of programs, reflecting no increase in departmental 1963 program or 1964 allowance, after figures of \$1,900,000 and \$2,000,000 were supplied to Budget Bureau.

⁶ Totals differ from figures of \$24,800,000 and \$34,900,000 printed in budget because of incorrect figures for Bureau of Reclamation included in totals supplied to Budget Bureau.

⁷ Total differs from figure of \$4,000,000 printed in budget, which was derived by rounding upward an erroneous total of \$3,958,000 reported to Budget Bureau.

⁸ Figure of \$900,000 printed in budget was rounded downward from agency asking of \$944,000; Budget Bureau allowance of \$840,000 received too late for correction of figure supplied for printing in budget.

Mr. ALLOTT. Mr. President, the figures in the table speak for themselves. However, to me it is significant that when all of the water research and development work that has been gathered together in the various departments is analyzed in light of the table, it will be found that we are now planning to spend for fiscal year 1964, \$76,419,000 for research in the use of water.

S. 2, would establish water resources research centers at land-grant colleges and State universities and would also provide additional funds, available to the Secretary of the Interior, to encourage research on all phases of water problems. The bill establishes a permanent program which, at the maximum, would require expenditures of \$20 million annually. This \$20 million is not in place of anything which is now being spent, but is in addition.

My concern is chiefly with the establishment of a permanent program at the outset. It is difficult, in fact impossible to tell how such a program will function, whether it will fill a need, whether it will overlap significantly work presently being carried on elsewhere. I feel certain that much of the work proposed by the bill to be done at colleges will, in fact, overlap work which is presently being financed by the National Science Foundation in those particular areas. For this reason I propose that a limita-

tion of 5 years be placed on the program, in order that Congress can then satisfy itself as to the success being encountered. Frankly, I hesitate to encourage potential participants in this program to look too far down the road, as this bill does, until we have a record to examine.

As matters now stand, the money in S. 2 is subject to appropriation, and although a permanent program, it would be terminated simply by Congress failing to provide the necessary moneys. This is an uncertain status in which to place these potential participants. It seems to me that the wiser course to follow is one which places a limitation at the outset with the understanding that, if a justification exists, this limitation can be lifted at the end of the trial period. To this end, amendments which I submitted earlier, Nos. 50, 51, and 52, and which I intend to offer, would place a 5-year limitation on all three phases of the bill. These amendments would have been offered during committee deliberations on S. 2. However, an emergency situation prevented my attendance at the time.

I observe in the Chamber the distinguished senior Senator from New Mexico [Mr. ANDERSON], the acting chairman of the committee at that time. He is also the author of the bill. What I have said concerning the offering of the amendments is no reflection upon

him. He has now had copies of my amendments for about a week and is fully aware of their content. Had it not been for an emergency, and had I been able to attend the executive session of the Committee on Interior and Insular Affairs when it considered S. 2, the amendments would have been offered at that time. I say this because objection is often raised on the floor of the Senate by asking why amendments were not offered in committee prior to their being offered on the floor. I can only say that because of an emergency the amendments were not offered by me in committee.

I have done my best to inform the chairman of the committee of my purpose and my intent; and in the regular course I shall offer the amendments.

Mr. ANDERSON. Mr. President, will the Senator from Colorado yield to me?

Mr. ALLOTT. I am happy to yield.

Mr. ANDERSON. I wish to confirm what the Senator from Colorado has said. Because of an emergency, he was required to be away from the committee. On Thursday, he did provide copies of the amendments; and I am glad to confirm what he has said.

Mr. ALLOTT. I thank the Senator from New Mexico. I have no criticism of him for the failure to consider the amendments at that time. The situation

which developed was unavoidable, and was not his fault, nor was it mine.

Five years would seem to be sufficient time in which to have the research projects begin to bear fruit. At the end of that period we shall have an adequate history upon which to make an informed judgment on the questions which, today, have no ready answer. I trust that the Senate will concur, and will adopt these amendments.

Mr. President, tomorrow I shall discuss the amendments at some length.

As an example of what I believe the bill will do—although I am sure it is not the intention of the Senator from New Mexico that the bill will do this—let me refer to section 100(a), of title I, on pages 2 and 3 of the bill, which authorizes the appropriation, for the fiscal year 1964 and subsequent years, for distribution to a college or university in each State and Puerto Rico, of "a sum adequate to provide \$75,000 to each State in the first year, to be increased by \$12,500 each succeeding fiscal year for 2 years and to continue at \$100,000 thereafter, for the purpose of establishing a collegewide or universitywide water resources research institute, center, or equivalent agency."

But in subsection (b), on page 3, we find this provision:

(b) There is further authorized to be appropriated to the Secretary of the Interior in the fiscal year 1964 the sum of \$1,000,000, increasing by \$1,000,000 each year for four years to \$5,000,000 in fiscal year 1968 and thereafter, which the Secretary of the Interior may use to match, on a dollar for dollar basis, funds made available to State water resources research institutes or centers by the States or other non-Federal sources.

I believe the "non-Federal sources" would certainly include the same universities dealt with in subsection (a) "to meet the necessary expenses of water resources research projects."

And so forth. I believe that, in all likelihood, Congress would continue the grants under subsection (a), but that at the end of the 5 years Congress might decide that it would be more feasible and more desirable for some other agency to utilize the \$5 million which now are proposed to be authorized for appropriation to the Secretary of the Interior, to be used for this purpose.

Tomorrow, I shall seek to have corrections made in various other items. Those amendments are chiefly mechanical in nature.

Title II provides:

SEC. 200. There is authorized to be appropriated to the Secretary of the Interior \$5,000,000 in fiscal year 1964, increasing \$1,000,000 annually for five years, and continuing at \$10,000,000 annually thereafter from which he may make grants, contracts, matching, or other arrangements with educational institutions, private foundations, or other institutions; with private firms and individuals; and with local, State, or Federal Government agencies, to undertake research into any aspects of water problems related to the mission of the Department of the Interior, which may be deemed desirable and are not otherwise being studied.

As I read the provisions of the bill—and I believe I have a correct understanding of the English language—these

provisions are to a great extent duplicative. I believe this provision of title II is to a great extent duplicative of the provisions of subsection (b), on page 4.

Tomorrow I shall go further into these matters.

It seems to me foolish to commit ourselves to an open-end authorization forever, when we are not certain that we shall wish to continue it forever.

I hope I shall persuade the Senator from New Mexico to see the light and to take the high road. In answer to my criticism, undoubtedly, it will be said, "If we do not like it, at the end of the 5 years we can revoke these provisions."

But, Mr. President, such a course is never taken; and at the end of the 5 years, the impetus to develop our water resources and to engage in research in that connection will be very great. So let us pass a 5-year authorization bill, and begin that work in a sound manner; and as the program develops let us ascertain how the Secretary of the Interior handles the other two grants made to him, with which he will have almost a free hand. If we then do not like the results, at the end of the 5 years we certainly can pass a new authorization bill. Undoubtedly there will be no difficulty in doing that for any portion of the program which is found to be desirable and good.

In my opinion, the part of the bill which relates to the developmental and research work at land-grant colleges and universities will be the only part which will really pay off in a large way. That is true because particularly in the West, where water has been a pressing problem, beginning with the very first settlements, the people know the importance of water, and have engaged in long-time research programs in regard to the use of water, its conservation, the prevention of water erosion, and similar problems. This work has been going on for years.

Therefore, Mr. President, I believe that the part of the bill which relates to developmental and research work at the land grant colleges and universities will pay off the most, because essentially the other provisions of the bill will duplicate to a certain extent the work of the National Science Foundation, although we would be placing the work in charge of the Secretary of the Interior. So I have my doubts about section 200.

We know that the work under title I must be done. So let us do it, and then examine the entire work done at the end of the 5 years. If that is done, I assure Senators that the part of the bill which I think will pay off—I refer particularly to the part in connection with the land grant colleges—will, if necessary, be renewed and reenacted at that time. As to the balance of the program, all of us will be the beneficiaries by not permanently placing on the statute books legislation which probably has no real need to be there.

Mr. DODD. Mr. President, the most pressing of all our resource problems is that of water. The situation is already acute, with actual scarcity threatening some areas of the country.

Because of the magnitude of this problem, I intend to support S. 2, the Water

Resources Research Act. This will be a modest program, but I believe it is an important step toward insuring that the water needs of the American people will be met in the years ahead.

I am especially pleased by the decentralized way in which this water resources program will be set up. S. 2 authorizes \$75,000 per year to a land-grant college, State university, or other institution of higher education in each State, at the discretion of the State, to establish and maintain a water-resources research institute or center. This is based on the highly successful agricultural research stations at land-grant colleges and State universities.

It assures that each State will be able to establish a water-research center, where attention can be focused on the water problems peculiar to a State or area. A few comments about my State should illustrate how important and eminently reasonable this State-by-State approach is.

Connecticut is a highly urbanized State, with a substantial amount of industry. The solution of our water problems does not lie in moving large quantities of water hundreds of miles, as, for example, from northern California to the southwestern part of that State.

In my State, we need research in pollution abatement, so as to develop improved methods for the treatment or control of the waste materials that are disposed of in water.

We need better ways to salvage waste water.

We need more insight and knowledge about the reuse, recycling, and the elimination of wasteful water use by industry and by urban areas.

It would be helpful to learn how to reduce evaporation from the surface of reservoirs.

These areas of study will benefit Connecticut and other States in a similar position. California and other Western States, with their vast geography, can at the same time concentrate on their own immediate problems.

One further field of study, which holds great promise for the alleviation of a future water shortage, is the desalting of saline or brackish water. Connecticut, as an eastern seaboard State, will no doubt want to go into this area of research, to help with its local needs. And this would be to the benefit of the rest of the United States and to other countries as well. Under the water resources research program, my State could look in depth into the possibilities of desalting water.

Several years ago, Connecticut and the other five New England States negotiated a northeastern water and related related resources compact, so that a cooperative, areawide effort could be made to study and work out the best ways for the six States to assure an adequate water supply in the years ahead. To date, four of the State legislatures have ratified this compact, and I intend to reintroduce shortly a bill to give congressional consent to this interstate agreement.

The northeastern compact and the Water Resources Research Act have the

same objective in mind, to assure a continued abundance of water, and the two, once operative, should complement each other nicely.

In fact, S. 2 would allow two or more States to designate a single interstate or regional research institute or center. This is a possibility that the State officials may want to look into and consider, in connection with the compact.

Each year the American people spend \$10 billion on public and private water facilities. It is estimated that during the 16-year period between 1959 and 1975, \$171 billion will be spent for these facilities. Against this background, the cost of the research bill we are debating today is indeed modest.

For the first year, the total cost of S. 2 would be just under \$10 million. Once it is in full operation the annual expenditure of Federal funds would be around \$20 million.

I am sure that the benefits we will receive from these research centers and the programs of matching grants for research by the centers and by other educational institutions, private foundations and business, and by individuals, will be worth many times our investment.

I hope the Senate will pass S. 2, and that the House, too, will take favorable action at an early date.

I observe that my colleague [Mr. RIBICOFF] is the Presiding Officer of the Senate at present. We are all familiar with his great and continuing interest in the problem of air pollution. But he has also been a leader in our State in the fight to rid our waters of pollution as well. It is a pleasure for me to join with him in the Senate in the struggle to clean up our streams and rivers and reserve an adequate water supply for our people.

Mr. METCALF. Mr. President, the kind things which have been said about the senior Senator from New Mexico, and the leadership he has provided in the conservation field, have been very much deserved.

It was my privilege to serve on the Interior and Insular Affairs Committee during his chairmanship in the 87th Congress. It was a privilege for, under his leadership, the committee has purposefully approached major conservation issues and attempted to implement programs which would deal with them wisely.

Since 1958, when he successfully sponsored the bill establishing the Outdoor Recreation Resources Review Commission, the Senator has kept recreation matters moving. A long stalemate in the development of parks has been ended. We have authorized a number of new areas in the past 2 years and we are now in the process of implementing on a nationwide basis, a thoughtful, forward-looking program to provide needed Federal, State and local recreation facilities, including a Wilderness Preservation System, seashores, and some magnificent new national park areas.

The Senator had a leading role in the enactment of a helium conservation program before many knew how important this rare element was becoming in our new technology.

Under Senator ANDERSON's guidance, effort is being made to keep the Nation abreast of its water problems not only through research, as proposed in the pending legislation, but by getting an adequate water resources planning program underway.

The Senator's energy and initiative have made him a very successful citizen in private business. He has worked at his public tasks just as assiduously, both to the great benefit of his State, and to the great benefit of the Nation.

Things which have been said of him here today, and will be said at the dinner in his honor May 20, are well deserved and even more.

In proposing and pressing the pending water resources research bill, the senior Senator from New Mexico has outdone himself and brought about what I regard as a miracle.

Last week, the members of the Interior and Insular Affairs Committee of the Senate received a letter from the Chamber of Commerce of the United States which is unprecedented in my experience in Congress, which dates back to the 83d.

For the first time in my experience, the Chamber of Commerce of the United States has agreed that a new Federal program, entailing Federal expenditures, is needed and would serve a useful purpose. They do not quibble over a penny of the money to be appropriated.

Of course, the chamber wants amendments to S. 2—amendments which I regard as unnecessary or unwise—but that was to be anticipated. The really significant thing about the chamber of commerce letter is its agreement that S. 2 has merit. I want to read into the CONGRESSIONAL RECORD what, to me at least, are some historical sentences. The Chamber of Commerce of the United States has written me:

Additional research, investigations and experiments in the field of water and related resources are needed to help meet the water demands of future generations. The training of additional scientists to conduct such activity is vital.

The stimulation of more research effort at industrial, State, and local levels and the training of additional scientists by the States and other agencies are the most satisfactory methods of achieving greater knowledge about water because they would minimize unwarranted Federal research activity, providing a preferable alternative to the expansion and duplication of federally conducted research effort * * *.

The Chamber of Commerce of the United States supports S. 2 subject to the amendments suggested hereafter.

I recognize that the endorsement of S. 2 has reservations. I want to deal with them, so the Senators may know that they are making no mistake to adopt S. 2 as it has been reported to the Senate.

First, however, I want to congratulate the senior Senator from New Mexico for having proposed the first new Federal program, involving an expenditure of funds, which, in my experience, at least, has received that sort of endorsement from the Chamber of Commerce of the United States. And I want to congratulate the chamber for going as far as it did.

Chambers of commerce in my home State of Montana, I am proud to say, have frequently supported desirable programs in past years. A number of them have given intelligent support to the programs for farmers. A number of them have endorsed proposals in the recreation field. In several instances they have taken progressive positions on measures which the chamber here in Washington has opposed.

Occasionally I have observed that other western chambers were becoming a little more progressive. It pleased me recently to see that the Salt Lake City Chamber of Commerce has given support to S. 859, the Land and Water Conservation Fund bill to implement a national recreation program, subject to a couple of amendments on distribution of funds which, while very important, are technical rather than fundamental. The fundamental principles and purposes of the bill were given support—just as the chamber of commerce of the United States has now, for the first time in my experience, given support to the fundamentals of proposed national legislation involving a new Federal program.

I want to discuss the amendments proposed to S. 2 by the chamber because there are pending several amendments, offered by the senior Senator from Colorado, some of which parallel the chamber's suggestions.

The first proposal is to amend the preamble of the bill to state that one of its purposes is to reduce the need for expansion of Federal water research agencies and activities.

S. 2 will have that effect. It will avoid the necessity of Federal laboratories handling a great many practical, local water problems. It will bring into water resources research non-Federal matching funds and non-Federal personnel—scientists in colleges and universities, foundations, and private life—who will undoubtedly make a great contribution in both practical and fundamental research if given the opportunity.

But there will remain water problems of national significance, as Senator ANDERSON has been careful to point out, which require major laboratories and major test facilities—and I am thinking in terms of saline water conversion, weather modification and aspects of pollution control—in which Federal expenditures will need to be increased. There is a possibility that we can provide underground storage for water, which avoids loss from evaporation and flooding of lands, at a fraction of reservoir costs, with atomic explosives. Development of this potentiality will necessarily have to be a Federal project.

So it would be a mistake, in my judgment, to put language in S. 2 that might later be interpreted as a declaration that need for expanded Federal research in the water resources field was being eliminated by S. 2. We should adopt the bill and actually reduce the demand without encumbering the measure with phraseology subject to later misinterpretation.

The chamber's second suggestion is for an amendment to assure that there will be optimum utilization of existing

water research facilities located in the individual or several States before any new water research agency or center is assisted.

A study of water resources research underway around the country made by the Interior and Insular Affairs Committee, showed that every land-grant college or university in the Nation, except possibly in Connecticut the home State of the Presiding Office where the experiment station is a separate institution, is doing water research. Each has a water resource facility of some sort. There are scores of facilities in other institutions ranging from one-faucet laboratories to a multiple-faucet laboratory with electronic computers in other institutions.

The very well intended suggestion of the chamber would lead to more debates over interpretation than results. What is a facility? What is a center? What is optimum utilization? I am happy to see that no such amendment has been offered.

A third suggestion of the chamber of commerce is that an advisory board of "qualified, top level scientists other than Federal employees" be given the power to allocate basic support funds under section 100(a) and to advise the Secretary whether certain water research efforts will contribute to a comprehensive, nationwide water related resources research program.

S. 2 provides, at section 300, that the Secretary of the Interior shall arrange for the regular advice and cooperation of all Federal agencies, of State and local governments, and of private institutions and individuals, in the administration of the program. It would be highly unwise, in my opinion, to exclude the fine scientists—some of the finest in the world, who have dedicated their lives at modest salaries to public service with Federal agencies—from the Secretary's council. It would be both improper and unwise to delegate the power to allocate and direct the expenditure of Federal funds to a group which has no responsibility to the Federal Government.

It is always difficult for me to understand the sort of prejudice against anyone who works for the Federal Government reflected in such a recommendation. Each of us in the Senate of the United States is a Federal employee—a part of the Federal Government. I do not believe that entering upon Federal service somehow automatically robs a man of all competence. I cannot believe that the Senate will for a moment consider an amendment that carries such an implication.

The most dangerous amendment suggested by the chamber of commerce, and I regret that such an amendment has been placed before us, is a proposal to put a termination date on the S. 2 program.

Mr. President, the ability of the senior Senator from New Mexico to diagnose and analyze problems, and get to the core of them, is nowhere better reflected than in S. 2's proposal of continuing program of Federal support of water resources research at non-Federal centers of competence.

The Department of Health, Education, and Welfare has for some time sought to place research contracts in the water pollution field at colleges and universities.

Last fall, Mr. Leonard B. Dworsky, assistant to the chief of the Division of Water Supply and Pollution Control at HEW, appeared at a symposium on social and economic research at Portland, Oreg., and complained a little about their experience. He said:

The universities are best geared to assume the major role of research in water pollution control needs. With isolated exceptions, however, there is little effort, little interest, and seemingly little understanding at the university level of these needs.

In contrast, S. 2 has created a great deal of interest on the part of universities in water research.

A panel of four State university presidents and the dean of engineering from Utah State University appeared at our hearings on S. 2 to endorse its passage. Other volunteer witnesses came from Michigan, Auburn, Harvard, California and elsewhere. There have been many enthusiastic letters of endorsement.

The difference between the HEW's disappointing experience, and the response to S. 2, lies in the assurance of continuity which S. 2 carries—a repeat of the now 75-year-old agricultural research program.

Dr. W. B. Morgan, president of Colorado State University, who is chairman of the Water Resources Committee of the National Association of State Universities and Land Grant Colleges, has described the importance of continuity to us as follows:

Colleges and universities cannot afford to build and equip laboratories and rearrange curriculums to accommodate a short-term program. Top scientists in disciplines related to water resources—physics, engineering, geology, botany, silviculture, meteorology, economics and many others—are not easily persuaded to specialize in water problems if there is the threat of termination of the principal program in the field. They look for specialties in which they may find a lifetime career. Neither can students be persuaded to spend many years in graduate training for work which may be stopped before they complete their training. The assurance of continuity which S. 2 provides is one of the basic strengths of the bill. Provision is made at section 305 for a comprehensive review at the end of 5 years. Congress can itself review the results of the work whenever it deems it appropriate. The adoption of the suggestion (for a termination provision) would be especially injurious to the bill.

Dr. Wayne Reitz of the University of Florida has commented to the author of S. 2:

To establish a definite termination date would mitigate against a State developing sound and farsighted programs for research in this important field. Had termination dates been provided for agricultural research, we would never have made the progress that has been made.

Mr. President, S. 2 has ample provision for review. That provision carries with it a notice to the participants in this program that results will be expected. But S. 2 does not carry a threat of termination which would stifle the project, before it got started.

If we put a 5-year termination in S. 2, we are in reality postponing for 5 years the opportunity to have an effective program. Many colleges, universities and needed scientists and students will undoubtedly wait to see if the program is to be renewed and continued before they dedicate their assets and their careers to the water research field.

Finally, Mr. President, the chamber of commerce has asked that sections 302 and 303 be eliminated. They authorize a Water Resources Service in the Department of the Interior to administer the S. 2 program, and 5 positions in that Bureau, in addition to the usual number, at a grade above civil service grade 15.

Many of us regularly oppose statutory direction or authorization of a subordinate agency in a department. The Cabinet Secretaries have authority to develop their own organizational patterns. They can establish bureaus and services as they feel the need.

The S. 2 provision is not mandatory. It authorizes a service.

There are both internal and external reasons why the provision for a service is appropriate in S. 2.

There are several agencies in the Department of Interior concerned with water resources. They would not be very alert, ambitious, or aggressive if they did not each want jurisdiction over the new S. 2 program, or at least a part of it. There will be pressure within the Department of Interior to assign the administration to a single existing agency, with a limited mission in the water resources field, or to segment it among several such agencies and thereby make it a disorganized operation by limited mission agencies.

In accordance with strong recommendations of our own Select Committee on Water Resources, of the National Academy of Sciences and other agencies which have studied the water research problem, S. 2 calls for a broad, multidisciplinary approach to water research.

It wisely calls for collegewide or universitywide institutes or centers at the State level, so no single discipline will dominate and narrow the approach to water problems at State level.

We must have that same broad, multidisciplinary approach at the Federal level—a single agency which looks at water from the viewpoint of all sciences and disciplines, not a single, narrow one.

The external pressure which the Department will feel in regard to administration of the program is exemplified in the chamber of commerce letter itself. It says:

Existing bureaus and services within the Department of the Interior should be assigned the responsibility of administering the programs that would be authorized by this legislation. * * *

Here again, from the outside, is the pressure to segment and disperse responsibility for the program, so it will become a group of limited mission programs rather than a broad approach.

Since section 302 only authorizes a water resources service, it in reality amounts to a strong expression of the belief of Congress that a single, new broad agency should handle administration, which is certainly desirable.

There is an unusually high relationship between the competence of people who run research programs and the results, or returns, from those programs. Highly trained, alert, and ingenious men can make research dollars repay investment hundreds of times over. No amount of money can produce results from a staff which lacks competence to do research work.

The provision for five extra positions in the water resources service at salaries which will attract and hold competent men will undoubtedly prove a very wise investment.

Mr. President, I regret that the chamber of commerce did not have a witness at the hearing on S. 2. I believe that we might have persuaded them, or they might have been persuaded by other witnesses, that the suggestions they have made are either sufficiently provided for in the bill, or would work to its detriment.

But, in any event, Mr. President, the most significant fact about the chamber is that it has, in this instance, approved a new Federal program.

The chamber has not quibbled about the expenditures proposed.

It has not objected to the formula Senator ANDERSON has given for basic support to State research centers, supplemented by two matching funds which will increase over 5 years to a total of \$15 million per year.

I want to congratulate the Chamber of Commerce of the United States for recognizing the basic merit of S. 2, and to congratulate the Senator from New Mexico for presenting us a proposal so obviously right that it has won this unusual approval.

Mr. MOSS. Mr. President, every time a measure which implements recommendations of the Senate Select Committee on National Water Resources takes a stride closer to enactment, I feel there should be rejoicing in the arid sections of the West and Southwest, because our very future is tied up in the extent to which we can husband our water supply—can increase and make better use of the water we have.

This bill before us today, S. 2, would help fulfill the third recommendation made by the Water Committee—the recommendation calling for a greatly expanded and comprehensive Federal program of scientific research on water, probing ways both to increase our supply and to increase the efficiency of the use of available water. And it would do this in a most practical and effective way in that it would, in many cases, strengthen research already established and staffed in many of our land-grant colleges and universities, or in other competent institutions of higher education in many States. In others it would provide a modest beginning, which we hope would attract other funds.

It was my privilege to serve on the Water Resources Committee and although I knew previously in general the outlines of our coming water shortage, my service on that committee has intensified my interest in legislation to head off our impending water bankruptcy.

Full development of all available water supplies will be necessary if we are not to be deficient in meeting consumptive water requirements by 1980 in five major river basins or areas: The South Pacific area, the Great Basin area, the Rio Grande-Pecos, the Lower Colorado and the Upper Missouri River Basin. I would point out that my State of Utah lies astride two of these water deficient basins—the Great Basin and the Lower Colorado River Basin.

Another three great water areas will be at the limit of their supplies, with full development by the year 2000. This group includes the western Great Lakes area composed of Michigan, northern Indiana, most of Illinois, and eastern fractions of Wisconsin and Minnesota. It also includes the western gulf area in Texas, and the upper Arkansas-Red River Basins involving major parts of Colorado, Kansas, and Oklahoma, and smaller sections of northeastern New Mexico and northern Texas.

Briefly, by the year 2000 the western half of this Nation excepting the Upper Mississippi, the immediate Mississippi River drainage area, the Lower Missouri and the Columbia River Basins will have come to the end of present available water resources.

Nor will the rest of the Nation escape the water shortage—by the year 2000 they will also be trying to conserve, purify, recycle, and transport water to points where needed, and their investments in water facilities could run well over \$10 or \$15 billion a year.

So this is not just a regional problem. It is one all of us must solve, and this bill before us today takes a giant step in that direction.

The 50 water research centers which this bill would establish in universities or colleges, and for which it would authorize \$100,000 each a year, would be ideally located and suited to passing on to water users the fruits of their research.

Dr. D. F. Peterson, dean of engineering at the Utah State University, who testified in behalf of the bill, made an excellent statement on the capability of colleges and universities to make available the knowledge resulting from work done in this field. Although Dr. Peterson's statement has been summarized in the very well prepared report on this bill—Senate Report 117—I would like to repeat parts of it for emphasis. He stated:

Many of the problems of applied research will have to be attacked item by item, location by location. Water resources development must be closely linked to community and even individual objectives and I believe the State research efforts will greatly assist the States in discharging their responsibilities in planning and development.

Bringing the universities into the picture has many advantages besides the production of increased manpower. Universities since World War II have demonstrated their capability in administration of research. The interdisciplinary resources of the university should accelerate the progress of basic and interdisciplinary research. In the university, research and teaching work together not only to develop the body of new knowledge, but

with the same effort to spawn the manpower capability which can carry the new knowledge to common practice.

Dr. Peterson is well equipped to make such observations. Utah's land grant college, Utah State University, is already far advanced in the development of a water research institute—the Utah Water Research Laboratory. The Utah State Legislature has appropriated substantial amounts for it, and during the past 2 years two Federal grants of \$200,000 each were obtained for the Logan laboratory, one from the National Science Foundation and one from the National Institutes of Health. The laboratory is now a going concern, and is in a strong position not only to soundly expand its research activities through the additional funds which would be made available through passage of this bill, but to provide the research facilities and instruction necessary to train some of the water scientists which will be needed in States and areas just inaugurating water research programs.

The Utah State University is also the location of a new Forest Service Watershed Research Laboratory for which facilities are now being constructed, and for which funds were appropriated in the 87th Congress. These facilities should be ready for use in about a year, and they will contribute to the growing reputation of the university as a water center.

It has been most satisfying to me to have a part in securing the additional Federal financing for the State water research laboratory and to work with the distinguished Senator from Mississippi [Mr. STENNIS] in establishing the watershed research laboratory at USU, just as it has been my pleasure to cosponsor S. 2 and support it in committee and here on the floor.

So I say with great earnestness that this is one of the most significant bills on which we will have an opportunity to act this session. It is important to all of us in all sections of the country—only through basic research can we increase our available supply of water and make the most efficient use of what we now have. I trust that this bill will pass.

PRIORITY TO ELECTRIC CONSUMERS IN PACIFIC NORTHWEST TO ENERGY GENERATED AT HYDRO-ELECTRIC PLANTS

Mr. MANSFIELD. Mr. President, I ask unanimous consent that the pending business be temporarily laid aside, and that the Senate proceed to the consideration of Calendar No. 100, Senate bill 1007, to guarantee electric consumers in the Pacific Northwest first call on electric energy generated at Federal hydroelectric plants in that region and to guarantee electric consumers in other regions reciprocal priority, and for other purposes.

Mr. KUCHEL. Mr. President, if I correctly understand the request of the Senator from Montana, it is that the pending business be temporarily set aside and that the bill, the title of which has been read, be placed before the Senate.

The PRESIDING OFFICER. The bill S. 2 would be temporarily set aside for consideration of the bill S. 1007. The Senator is correct.

Mr. KUCHEL. For the RECORD, so that the situation will be clear in the RECORD for Senators to see tomorrow, it is my understanding that the bill S. 2 would be temporarily set aside so that the distinguished author of the bill S. 1007, the junior Senator from Washington [Mr. JACKSON], may speak concerning it. No votes of any kind on the measure are contemplated today. At the end of what ever discussion may ensue on the bill S. 1007, the Senate will return to consideration of Senate bill 2.

Mr. MANSFIELD. Tomorrow. The Senator is correct.

Mr. KUCHEL. I thank my able friend. The PRESIDING OFFICER. Is there objection to the request of the Senator from Montana?

There being no objection, the Senate proceeded to the consideration of the bill (S. 1007) to guarantee electric consumers in the Pacific Northwest first call on electric energy generated at Federal hydroelectric plants in that region and to guarantee electric consumers in other regions reciprocal priority, and for other purposes.

Mr. JACKSON. Mr. President, S. 1007, a bill to guarantee electric consumers in the Pacific Northwest first call on electric energy generated at Federal hydroelectric plants in that region and to guarantee electric consumers in other regions reciprocal priority, and for other purposes, in similar to S. 3153, passed by the Senate on August 8 of last year. It differs from S. 3153 in that two clarifying amendments suggested by Governor Hatfield of Oregon have been added to the bill.

The purpose of this bill is to define the primary marketing area of the Bonneville Power Administration and permit the orderly marketing of surplus or seasonal hydroelectric power outside Bonneville's present marketing area.

The Northwest is unique in generating 97 percent of its electricity by water power. The area has had for many years and will continue to have large surpluses of seasonal or dump power, that is, power which is available when streamflows are normal but is not available in critical water years. At the present time, billions of kilowatt-hours of this power and millions of dollars of revenue are being wasted in water spilled over the great power dams of the Northwest. A market for this surplus power is available in the Southwest, principally in California.

At the time of the passage of the Bonneville Power Act in 1937, Bonneville's marketing area was defined as that area within "economic transmission distance." Transmission distance then was limited by technology to approximately 200 miles. With the technological developments of recent years, it is now possible to transmit power thousands of miles. As a result, with the surplus seasonal power in the Pacific Northwest and a marketing need for such power in the Southwest, it was inevitable that there would be proposals to construct a high-

voltage interconnection or intertie linking the Pacific Northwest to the Pacific Southwest and permitting the sale of Pacific Northwest surplus power. The early construction of such an interconnection was recommended by a special task force of the Department of the Interior. Subsequently the Pacific Gas & Electric Co. and the Pacific Power & Light Co. announced plans for a 110-mile 230,000-volt interconnection between southern Oregon and northern California, capable of being stepped up to a total voltage of 550,000 volts. Recently, at the request of the House and Senate Appropriation Committees, the Bonneville Power Administration circularized the utility industry of the west coast to determine the extent of interest among non-Federal utilities in the construction and use of such an intertie. To date Bonneville has received seven proposals for non-Federal construction of all or parts of two intertie lines.

This bill, like last year's bill, contains no authorization for a Federal intertie. Existing statutes authorize the Secretary of the Interior to construct such a line. This bill does facilitate the fullest practical use of an intertie whether it is built by the Federal Government or by non-Federal public or private utilities. It provides for the sale in the Pacific Southwest of existing Northwest surplus energy and any additional surplus energy which may be installed. It provides for transmission north of energy made available in the Southwest to firm up a portion of the Northwest's secondary energy, thereby making optimum use of the plant facilities in both regions. This is possible because the Northwest's electric consumption has a winter peak and the Southwest's electric consumption has a summer peak. It will be possible by maximum use of the resources of both regions to save new plant investment greater than the cost of any intertie, with resulting economies to electric users in both regions.

Whatever form an intertie may take, it is necessary to define the primary marketing area of the Bonneville Power Administration and to establish by law the ground rules for transfers of power between that marketing area and other regions. This legislation meets that need. Under this legislation an intertie could not be used to sell outside a region year-round firm hydroelectric power generated by the Federal Government in that region. Firm power is power that could be produced if the most critical river flow on record should reoccur. It is power absolutely essential to the region. None of the intertie proposals and none of the users of the proposed intertie has asserted that year-round firm hydroelectric power for which there is a demand in a region should be sent outside that region. Yet if an intertie is built without the orderly ground rules for transfer of power set up by this proposed legislation, it would be possible to require such a shipment of needed firm power with disastrous economic consequences to long-established industries and private utilities. S. 1007 expressly permits the Bonneville Power Administration to sell surplus electric energy and peaking

capacity outside its described marketing area subject to recall when such electricity is needed within the marketing area.

The marketing area described in S. 1007 was selected because it makes economic sense. It would comprise some 259,000 square miles and would be one of the largest marketing areas of any electric utility system in the United States. By comparison, the marketing area established by Congress for the Tennessee Valley Authority is about one-third the area described in this bill.

This bill has been drafted by the Bonneville Power Administration with great care in consultation with all of its customers, public agencies, private utilities, and private industry, and the Governors of Washington, Oregon and California.

I add that the bill is being sponsored by all the Senators from the Pacific Northwest.

In summary, S. 1007 should be enacted:

First. Because it will help end a shocking waste of resources. In 1962 \$23 million of unsold surplus power were lost over the spillways in the Pacific Northwest; this is the equivalent of 20 million barrels of oil wasted.

Second. It will provide for the orderly transfer of large quantities of power between the regions of the Pacific Northwest and the Pacific Southwest with great savings to the electric consumers of both regions.

Third. It will provide for the sale of such surplus power without disastrous and indefensible economic consequences to private investment and employment which might otherwise occur.

Mr. President, these are only some of the compelling reasons for the enactment of S. 1007.

The PRESIDING OFFICER. What is the will of the Senate?

Mr. METCALF. Mr. President, I suggest the absence of a quorum.

The PRESIDING OFFICER. The clerk will call the roll.

The legislative clerk proceeded to call the roll.

Mr. CLARK. Mr. President, I ask unanimous consent that further proceedings under the quorum call may be dispensed with.

objection, it is so ordered.

The PRESIDING OFFICER. Without

THE UNITED STATES-UNITED NATIONS POLICY IN THE CONGO

Mr. CLARK. Mr. President, when I had occasion to address the Senate a month or so ago I pointed out the substantial success of the United States-United Nations policy in the Congo. I invited attention to how wise the policy of our President and of our State Department in that area had been, as a result of which the Congo had been pacified under the leadership of the United Nations and peace reestablished there under the leadership of Premier Aduala.

Recent newspaper accounts indicate that, despite the criticism of many in this country and elsewhere—criticism by

Digest of CONGRESSIONAL PROCEEDINGS

OF INTEREST TO THE DEPARTMENT OF AGRICULTURE

OFFICE OF
BUDGET AND FINANCE

(For information only;
should not be quoted
or cited)

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HIGHLIGHTS: Senate passed water resources research facilities bill. Sen. Morse criticized restrictions on imports of fresh fruits by European nations. Sen. Burdick introduced and discussed measure to provide study of freight rates for small grains.

SENATE

1. WATER RESEARCH. Passed with amendments S. 2, to provide for the establishment of water resources research centers at land-grant colleges and State universities. pp. 6401-2, 6409-22

Agreed to the following amendments:

By Sen. Allot, to strike out provisions authorizing the Secretary of the Interior to establish a Water Resources Service for administering the water resources research program. pp. 6411-2

By Sen. Allott, to confer authority on the Secretary of the Interior to determine whether a land-grant college will receive grants and how much it will receive. p. 6412

By Sen. Allott, to provide that the Secretary of the Interior shall submit a report on progress and accomplishments under the program within two years

after enactment of the bill (rather than within six years). pp. 6412-3

By Sen. Miller, to provide that State legislatures may determine whether both a land-grant college and one or more universities or institutions in the State may be designated to conduct research under the bill. pp. 6418-9

By Sen. Mohnston, to provide that the Postmaster General shall determine the amount of postage for penalty mail used under terms of the bill. p. 6419

By Sen. Long (La.), to provide that the Government shall retain patent rights to inventions resulting from research under the bill. p. 6419

By Sen. Allott, to authorize advance payments of initial expense to educational institutions and nonprofit organizations. pp. 6419-20

Rejected the following amendments:

By Sen. Allott, to provide that each institute or center would determine the problems on which it would conduct research. pp. 6409-11

By Sen. Allott, 30 to 61, to limit the appropriation authorization to \$5 million annually (rather than authorizing a gradual increase to \$10 million annually). pp. 6413-7

2. ELECTRIFICATION. Passed without amendment S. 1007, to guarantee electric consumers in the Pacific Northwest first call on electric energy generated at Federal hydroelectric plants in that region and to guarantee electric consumers in other regions reciprocal priority. pp. 6423, 6424-8
3. FOREIGN TRADE. Sen. Morse stated that "the discriminatory practices levied by certain European nations against imports of our American fresh fruits are continuing in substantial degree," suggested that "retalitory measures" be taken, and inserted his letter to the President's Special Representative for Trade Negotiations on the matter. pp. 6400-01
4. PUBLICATIONS; FEDERAL REGISTER. The Judiciary Committee reported without amendment H. R. 2837, to amend the Federal Register Act so as to authorize the Administrative Committee of the Federal Register to adopt improved publication techniques (S. Rept. 145). p. 6368
5. TRANSPORTATION. Sen. Smathers inserted an article by the president of the U. S. Freight Co. urging greater unity in the transportation industry as a means of solving its problems. pp. 6422-3
6. FOREIGN AID. Sen. Javits announced and commended the organization of the Atlantic Community Development Group for Latin America to encourage Western European investment in Latin America. pp. 6403-5
7. PERSONNEL. Sen. Brewster commended the awards of the National Civil Service League to ten outstanding Federal career employees. pp. 6399-6400
8. 4-H CLUBS. Sen. Randolph commended the work of the 4-H Clubs. p. 6397
9. RESEARCH. Sen. Javits inserted the recommendations of the Committee on Sponsored Research of the American Council on Education for improving relations of the colleges and universities with the Government on Federal grants and contracts for research. p. 6391
10. RECLAMATION. Sen. Mansfield inserted an article commending the benefits of reclamation projects, "Reclamation Pays 5 to 1 in 61 Years." p. 6386
11. COMMITTEE STAFFS. Sen. Dirksen inserted a study by the Library of Congress with respect to staffing of committees in the Senate. pp. 6381-6

and treaties to effectively bring to an end these discriminatory barriers against our American fresh fruits, particularly apples and pears.

Your assistance in this matter at an early date would be appreciated.

Sincerely,

WAYNE MORSE.

COMMUNIST DAMNATION OF ESTONIA, LATVIA, AND LITHUANIA

Mr. BREWSTER. Mr. President, Americans who contemplate the present status of the once proud nations of Estonia, Latvia, and Lithuania, cannot avoid a deep sense of regret and of sympathy for the injustices suffered by the citizens of these nations who must now live under Communist domination.

I rise today to pay my respects to the determination of these great peoples, and of their relatives here in the United States, in their efforts to regain the freedom and independence of their native lands.

I ask unanimous consent to have inserted in the RECORD, at this point, a noble resolution, recently framed by the sons and daughters of these countries who now make significant contributions to American society in Maryland, but are not unmindful of the needs of their relatives back home.

My concern, and the concern of all Americans for these people, has led me to forward copies of this resolution to the President of the United States, the Secretary of State, and our permanent Ambassador to the United Nations.

There being no objection, the resolution was ordered to be printed in the RECORD, as follows:

Whereas the greatness of the United States is in large part attributable to its having been able, through democratic process, to achieve a national unity and freedom of its people, even though they stem from the most diverse of racial, religious, and ethnic backgrounds; and

Whereas this national unification of the free society has led the people of the United States to possess a warm understanding and sympathy for the aspirations of peoples everywhere; and

Whereas so many countries under colonial domination have been or are being given the opportunity to establish their own independent states, the Baltic Nations having a great historical past and having enjoyed the blessings of freedom for centuries are now subjugated to the most brutal colonial oppression; and

Whereas the Communist regime did not come to power in Lithuania, Latvia, and Estonia by legal or democratic process; and Whereas the Soviet Union took over Lithuania, Latvia, and Estonia by force of arms; and

Whereas Lithuanians, Latvians, and Estonians desire, fight, and die for national independence and freedom; and

Whereas the Government of the United States of America maintains diplomatic relations with the Governments of the Baltic Nations of Lithuania, Latvia, and Estonia and consistently has refused to recognize their seizure and forced incorporation into the Union of the Soviet Socialist Republic; and

Whereas no just peace and security can be achieved in the world while these and other nations remain enslaved; Now, therefore, be it

Resolved, That the Senate and House of Representatives of the United States of America request the President of the United

States to bring up the Baltic States question before the United Nations and ask that the United Nations request the Soviets (a) to withdraw all Soviet troops, agents, and controls from Lithuania, Latvia, and Estonia; (b) to return all Baltic deportees from Siberia, prisons and slave camps in the Soviet Union; and be it further

Resolved, That the United Nations conduct free elections in Lithuania, Latvia, and Estonia under its supervision.

TRIBUTE TO HEROES OF THE WARSAW GHETTO

Mr. CASE. Mr. President, 20 years ago, from April 19 to May 8, 1943, the Jews of the Warsaw ghetto carried on a heroic and hopeless fight against the overwhelming power of the Nazi troops bent on their extermination.

While each of us would probably rather forget that humanity is capable of acts of extermination such as those carried out by the Nazis, I think it is well for us to look back on this tragic event, perhaps the most tragic event in recent history. For a new generation has grown up since 1943 which might otherwise never fully realize that acts such as this took place during their childhood.

Reflection on the Warsaw uprising will remind us, too, of the valor of the human spirit, as well as the need to prevent any recurrence of the depravity of which man is also capable. With a little sharper awareness of the danger of mass murder, our country might long since have ratified the Genocide Convention, signed by our Government at the United Nations in 1948.

In 1943, Wolf Zyto, now a dental technician living in London, was a young man in his early twenties who had escaped from the Warsaw ghetto and who was living outside it, with some members of his family still confined within the ghetto. He is one of the few escapees from the ghetto who witnessed the valiant Warsaw uprising and who lived to record his memories of it.

Mr. President, on Sunday, April 21, the Washington Post republished some memories by Wolf Zyto of this period, written in diary form and sent to the London Observer. I ask unanimous consent to have published in the Appendix of the RECORD part of the Washington Post's introduction to these published memories and part of Mr. Zyto's entry for Tuesday, April 20, 1943, the day after the Nazi troops began their campaign of annihilation.

There being no objection, the article was ordered to be printed in the RECORD, as follows:

TUESDAY, APRIL 20, 1943

(This is the diary of a Jew who watched his family and his people dying in the ghetto. Wolf Zyto was one of the Polish Jews who survived with the help of their Christian neighbors. In April 1943, he was living in Warsaw under an assumed name, working in a factory and sheltered by a friendly Polish family. Earlier, Zyto had lived in the ghetto itself. He acted as one of the couriers who smuggled in food. Some of his family managed, like him, to escape from the ghetto. But his mother and a brother were still there when the Germans launched their attack. At the time, Zyto was 21. He now lives in London and is a dental tech-

nician. He recently wrote down his memories in diary form, to exorcise the past, and sent them to the London Observer on the off-chance that it might publish them.)

I haven't slept all night, but have met by arrangement my elder brother, and we go to a friend's family at Okopowa Street opposite the Feifer leather works. From their second-floor window, looking through the curtains, I can see German soldiers. They have an anti-tank gun in position behind the leather works and are firing away at dead and apparently empty houses, setting them on fire.

Then the figure of a man appears at one of the top windows of a six-story house that is burning, and after a moment's hesitation he jumps.

Henry and Janina S. and their father, Stanislaw S., all are in tears and have been praying silently. My brother takes me in his arms and tries to stop my sobbing, but he cannot keep back his own tears.

What a courageous man Stanislaw S. is. One of the lights that shine in this dark age. He is about 60 years old and until today worked in Przytulski leather works, which are in the ghetto. He had a special permit, but instead of entering the ghetto through the gate in Dzlka Street, as was marked on his card, he would pretend he had made a mistake and walk through the gate at Gesia Street, so that he passed the house where we lived—and where my mother and little brother are still hiding because old people and children are no longer allowed. Stanislaw S. would pass on a loaf of bread, already specially thickly buttered, and sometimes even a bottle of milk.

This was supposed to be his own lunch, and he would then go hungry all day because the Germans checked everything they carried in their pockets. If he had been caught he would have been shot on the spot. We hoped that one day we might find a place for my mother and little brother, and ways of getting them out, but now all hope is gone.

The spring sun is still shining, but thick clouds of smoke hang over the rooftops. From time to time there is machine-gun fire, and single explosions of cannon shells and grenades.

What can I do? The wall is surrounded in such a way that a mouse could not get through.

I go out into the street and into a church. Unbelievable quiet. I can't think, but I look at a figure of Christ, and I ask inside me, "How many times have You been crucified? * * *

Mr. MANSFIELD. Mr. President, is there further morning business?

The PRESIDING OFFICER. Is there further morning business? If not, morning business is closed.

ESTABLISHMENT OF WATER RESOURCES RESEARCH CENTERS

The Senate resumed the consideration of the bill (S. 2) to establish water resources research centers at land-grant colleges, and State universities to stimulate water research at other colleges, universities, and centers of competence, and to promote a more adequate national program of water research.

The PRESIDING OFFICER. The morning business having been concluded, the unanimous agreement entered into yesterday with respect to the bill (S. 2) to establish water resources research centers at land-grant colleges, and State universities, to stimulate water research at other colleges, universities, and cen-

ters of competence, and to promote a more adequate national program of water research, controlling time, becomes effective.

The bill is open to amendment.

Mr. MANSFIELD. Mr. President, I ask unanimous consent that I may be permitted to intrude a quorum call for not to exceed 5 minutes.

The PRESIDING OFFICER. Is there objection? The Chair hears none, and the clerk will call the roll.

The legislative clerk proceeded to call the roll.

Mr. MANSFIELD. Mr. President, notwithstanding the previous unanimous-consent agreement, I now ask unanimous consent that the order for the quorum call be rescinded.

The PRESIDING OFFICER. Without objection, it is so ordered.

Mr. JAVITS obtained the floor.

Mr. JAVITS. Mr. President, I ask unanimous consent that I may proceed for 15 minutes without the time being charged to the bill, and that in addition I may proceed for as long as it is necessary to yield to my friend and colleague the Senator from Virginia [Mr. ROBERTSON].

The PRESIDING OFFICER. Is there objection? The Chair hears none, and it is so ordered.

Mr. JAVITS. Mr. President, I yield to the Senator from Virginia.

Mr. ROBERTSON. I thank the distinguished Senator from New York for yielding to me.

REPEAL OF THE SILVER PURCHASE ACTS

Mr. ROBERTSON. Mr. President, the administration has proposed to repeal the silver purchase acts and the silver transactions tax and to authorize the Federal Reserve Board to issue \$1 and \$2 Federal Reserve notes. Questions have been raised as to whether this proposal would be inflationary or would be a step in the direction of devaluation of the dollar. This question will loom large in the minds of the Committee on Banking and Currency next Monday when it hears testimony on H.R. 5389, the House-passed administration bill.

I am particularly concerned because of my interest in a sound economy and a sound Federal financial position. I have expressed many times my concern over current inflationary trends, including particularly those relating to Federal tax and spending policies and our national balance of payments.

Consequently, if I thought the purpose or effect of H.R. 5389 was inflationary, or if I thought that its purpose or effect was to devalue the dollar, I should oppose it vigorously.

However, from everything I have heard about this bill so far, including the strong support given to this administration proposal by Secretary of the Treasury Dillon and Federal Reserve Board Chairman Martin, the bill does not seem to me to be inflationary, nor does it seem to be a step in the direction of devaluation of the dollar. On

the contrary, it seems to me that the threat of inflation and devaluation of the dollar comes from other sources.

As I see it, the principal danger of inflation—aside from imprudent price and wage policies, which injure our balance of payments as much as they injure our domestic situation—comes from constantly unbalanced Federal budgets, which would cause immediate and uncontrolled inflation, if the Federal Reserve Board were not extremely cautious in exercising its existing monetary authority.

At the present time, demand deposits in commercial banks—by all odds the largest and most important form of money in the country—amount to about \$115 billion. This amount is limited and controlled in large part by the Federal Reserve Board's power over reserve requirements. The Federal Reserve Board now requires reserves on demand deposits of 16½ percent for Reserve city banks and 12 percent for country banks. The Board has power, under existing law, to reduce these requirements to 10 percent and 7 percent, respectively. This action would immediately release about \$6.25 billion in reserves, which might be expected to generate up to \$50 billion in demand deposits. In other words, the Federal Reserve Board today could, if it chose, increase demand deposits by about \$50 billion, or almost 50 percent.

At the present time, we have some \$3 billion in free gold. The Federal Reserve Board could use this \$3 billion to support new bank reserves through Federal Reserve purchases of Government securities. This would increase bank reserves by about \$12 billion, and, even at present reserve requirement levels, could generate up to \$80 billion in demand deposits. In other words, the Federal Reserve Board could today, if it chose, increase demand deposits in this fashion by up to \$80 billion, or about two-thirds.

If the Board should at the same time reduce reserve requirements, demand deposits could rise as high as \$300 billion, about 2½ times the present figure.

Or the \$3 billion in free gold could also be used to increase by \$12 billion the supply of Federal Reserve notes outstanding, now almost \$30 billion, an increase of more than one-third.

The existence of these authorities in the Federal Reserve Board at the present time means, of course, that we now have a managed currency. We accomplish nothing if we deny this or try to conceal it. We would do better to recognize it frankly and to rely on managing it well and responsibly, as I believe the Federal Reserve Board is now doing.

I believe it is equally important for the executive branch and the legislative branch to act responsibly with respect to Government revenues and expenditures. Permitting the Government budget to be unbalanced on the upside of a business cycle is not, in my judgment, acting wisely or responsibly. And a deficit of the nature which would result if taxes are cut \$10 billion, without a corresponding reduction in expenditures, would not, I am convinced, be consistent with sound

fiscal management and responsible monetary policy.

The proposed change from silver certificates to Federal Reserve notes would, however, not have any bearing whatever on our financial stability. A comparison of the quantity of \$1 and \$2 silver certificates—the only certificates affected by the bill—makes clear the relative unimportance of these certificates, of which only \$1.5 billion were outstanding on March 31, 1963. At the same date, \$2.4 billion in subsidiary silver and minor coins were in circulation; almost \$30 billion in Federal Reserve notes were in circulation; and demand deposits amounted to \$115 billion.

Fluctuations in the price of silver mean that the value of the security behind a silver certificate varies greatly from time to time. A \$1 silver certificate is backed by 371.25 grains of pure silver, or just over three-fourths of an ounce. In 1932, the price of silver sank as low as 25 cents and ounce. At that rate the silver in a silver dollar was worth something less than 20 cents.

For virtually all of the period covered by the silver purchase acts, the price of silver has been 91 cents an ounce or less. At that price the silver in a silver dollar was worth no more than 70 cents. For 10 years—from 1935 to 1945—the price of silver was below 50 cents. At that price the silver dollar contained less than 40 cents worth of silver.

The \$1 and \$2 Federal Reserve notes which would be authorized under the bill would be backed up, like all other Federal Reserve notes, by 25 percent gold and 75 percent in Government bonds and other eligible paper.

Federal Reserve notes and silver certificates, and U.S. notes too, are legal tender for all debts, public and private. All of these notes and certificates are completely interchangeable, and they are, as we all know, equally acceptable to the public.

The Government stopped selling silver in November 1961. At that time the market price was approximately 91 cents, the Government's selling price. This was an artificially low price kept down by the Government's sales from the amounts it had previously been required to buy under the silver purchase acts. Over the 15 years preceding the Government's decision to stop selling silver, consumption in the United States for industrial uses and coinage had risen from the 1947-49 average of 119 million ounces to 161 million ounces in 1961, while the aggregate of net imports and American production had sunk from a 1947-49 average of 77 million ounces to 68 million ounces in 1961. The deficit was made up by Treasury sales, which began to be substantial in 1959 and rose to 62 million ounces in 1961, not counting 55 million ounces used for coinage.

As soon as the Treasury stopped selling silver, the price rose sharply. It now is at about \$1.27½ an ounce. With silver at this price, a \$1 silver certificate is backed up by about 98 cents in silver.

The break-even point comes when the price of silver is \$1.29-plus an ounce. At

"Deeds not words," was the Eisenhower phrase. It still goes.

Mr. President, I did not read the text of the comments of former Vice President Nixon, and therefore I cannot comment very well upon the points which my able friend from Oregon has raised.

There is no more vigorous advocate in the Senate than my colleague the distinguished Senator from Oregon [Mr. MORSE]. When I propose a measure which is controversial, I am always happy when my friend the Senator from Oregon [Mr. MORSE] is on my side and agrees with me.

I take the floor of the Senate on this occasion to say that from the newspaper accounts of former Vice President Nixon's speech, I do not consider it a "shocking" speech. In my judgment his speech reflected the uneasiness of the American people with respect to the continuing presence in Cuba, 90 miles off our shore, of a Communist ideology. They hope and pray—I go further than that when I say they demand—that our Government do everything that can be done to isolate and eventually to eliminate that hazard from our way of life.

Former Vice President Nixon is an American. He did not attack President Kennedy as an appeaser. He simply presented his views with vigor to an audience of newspaper editors which extended an invitation to him to speak on the occasion of their convention.

I say very frankly to my friend from Oregon that, when the President of the United States the other day approved a loan to Brazil I did not denounce that loan. But I say to him most sincerely that I desire more facts with respect to the reasonableness of that loan before I place my own personal stamp of approval upon it. We must remember that a few weeks ago the State Department publicly said that Communists were working their will in the government of Brazil.

The PRESIDING OFFICER. The time of the Senator has expired.

Mr. KUCHEL. Mr. President, I ask unanimous consent that I may have an additional 3 minutes.

The PRESIDING OFFICER. Is there objection? The Chair hears none, and it is so ordered.

Mr. KUCHEL. A couple of days later the State Department said that Communists did not dominate Brazil. As an American citizen I say that if Brazil went down the Communist drain it would be another body blow to the cause of freedom. We do not want our hemisphere to go Communist. For that reason, I shall continue to support the Alliance for Progress. I desire that our ties with our Latin American neighbors be strong. I wish to see us go forward in helping those countries eliminate many of the causes for communism—ill health, poverty, illiteracy, poor housing, lack of widespread individual landownership, sickness, and disease. But I do not consider the comments of the former Vice President last week to be susceptible of the interpretation which my able friend has placed upon them, as he has a perfect right to do. I merely believe that he reflected the feeling of the American

people that we desire peace with justice and honor. We seek it. For that reason, we wish to continue to negotiate with the Soviet Union for a dependable and realistic test ban. That is why we hope and pray that the Atlantic Alliance may continue strong.

I generally share my colleague's views with respect to the problem of the nuclear deterrent. Quite aside from that, the American people want our country and our Government, as I say, to be united, to continue a policy of firmness toward our unyielding, unalterable American goal—to protect our own security, to eliminate communism from this hemisphere, and eventually to give to the people on this earth an opportunity themselves to determine how their own society shall conduct their own business.

ESTABLISHMENT OF WATER RESOURCES RESEARCH CENTERS

The Senate resumed the consideration of the bill (S. 2) to establish water resources research centers at land-grant colleges and State universities, to stimulate water research at other colleges, universities, and centers of competence, and to promote a more adequate national program of water research.

Mr. METCALF. Mr. President, what is the pending question?

The PRESIDING OFFICER. The water resources bill, known as S. 2, is before the Senate. The bill is open to amendment.

Mr. METCALF. Mr. President, I ask unanimous consent that I may suggest the absence of a quorum, and that the time for calling the roll not be charged to either side.

The PRESIDING OFFICER. Is there objection to the request by the Senator from Montana? The Chair hears none, and it is so ordered.

Mr. METCALF. Mr. President, I suggest the absence of a quorum.

The PRESIDING OFFICER. The clerk will call the roll.

The legislative clerk proceeded to call the roll.

Mr. MANSFIELD. Mr. President, I ask unanimous consent that the order for the quorum call be rescinded.

The PRESIDING OFFICER. Without objection, it is so ordered.

Mr. ALLOTT. Mr. President, I call up my amendment No. 54.

The PRESIDING OFFICER. The amendment offered by the Senator from Colorado will be stated.

The LEGISLATIVE CLERK. It is proposed, on page 3, line 9, after the word: "advisable", to add the following: "by the institute or center."

The PRESIDING OFFICER. How much time does the Senator yield to himself?

Mr. ALLOTT. I yield myself 5 minutes.

Mr. President, I think the purpose of this particular amendment is clear. It is an exceedingly simple amendment. It is a perfecting amendment. The purpose of it is to keep the control of the research in the hands of the institute or center. It is an amendment to cer-

tain language in section 100(a) of the bill, which provides for research at the land-grant colleges and institutes.

The bill now reads: "as may in each case be deemed advisable, having due regard to the varying conditions and needs of the respective States and Puerto Rico."

In my opinion, that language makes the bill uncertain. I do not know what is meant by "as may in each case be deemed advisable." I do not know who determines what is advisable. So the purpose of my amendment is to be certain that the institution in the particular State where the problems are being studied is the judge of what the problems are and what is advisable, and in what case it is advisable.

I felt certain that this was merely a perfecting amendment and that the author of the bill would be willing to accept it. I am sure it would not be his idea that, for example, in the State of New Mexico the decision as to what was to be deemed advisable would be made here in Washington. I know that for the State of Colorado I would have no desire to see the Secretary of the Interior have control of money or a project where he has the say as to what is advisable. Because of the many ramifications of this subject, I think it is for the States to say which ones are advisable and which ones are not.

I may ask the distinguished Senator from New Mexico as to whether he has objection to this amendment.

Mr. ANDERSON. I may say to the able Senator from Colorado that I do have opposition. It is not the objection which the Senator probably thinks I have, but I will discuss it shortly.

Mr. ALLOTT. That being the case, and having stated my reasons for the amendment, I will reserve the remainder of my time.

Mr. ANDERSON. Mr. President, I wish to yield some time to the Senator from Michigan [Mr. HART].

Mr. HART. Mr. President, it was necessary for me to be in Michigan yesterday, and I was thus unable to join in the opening discussion of the pending bill (S. 2) and in the compliments paid its chief sponsor, the Senator from New Mexico [Mr. ANDERSON]. But as a cosponsor of this bill, and also as one of the "minority of four" who had urged a more forceful report from the Senate Select Committee on National Water Resources, I am delighted and gratified that the Senator from New Mexico is forcefully pursuing the recommendations of our committee. He is not letting them die on the shelf. He is proceeding promptly, thoughtfully, and thoroughly to see that they are implemented. It is clear that he intends to see that we take all possible actions to meet the Nation's water needs of the future as envisioned by our committee.

This particular bill has been most warmly received in Michigan. Dr. John A. Hannah, president of Michigan State University, was given a draft of the bill last summer. He endorsed the concept, and said:

"The draft bill takes cognizance of the fact that the use of water constitutes one of the

most complex and pressing problems confronting almost every State in the country.

We in Michigan will put this program to good use. I commend the Senator for his initiative in the drafting of the legislation and for his leadership in bringing it to the floor of the Senate. I hope it will be supported overwhelmingly.

I support the Senator in his opposition to the pending amendment.

Mr. ANDERSON. Mr. President, the Senator from Alaska wanted to speak on the bill. I thought this would be the best time for him to do so, and I yield him some time.

Mr. GRUENING. Mr. President, we are witnessing a historical change in our national thinking, as we find citizens becoming increasingly aware of the value—indeed of the preciousness—of our water resources. The bill we are considering, S. 2, provides that, in addition to the land-grant colleges and State universities, other universities and research institutions may also be aided in water resources research.

Our water resources are not by any means inexhaustible. Nor are they at present well tended. The cosponsors of S. 2 heard testimony outlining the severity of the water shortage which our country faces. Some States have already experienced the fears and frustrations arising from inadequate water reserves. I am pleased to cosponsor this legislation which should help solve some of our water resource problems.

President Kennedy's task force on water resources reported that water is being used at an alarming rate. The issue, of course, is how do we best utilize our water? How can waste be eliminated? How can reuse methods for water be found? How can the waters of the sea be desalinized at the least cost? How can water pollution be ended? How can we assure adequate water supply for the future?

As I have had occasion to say before, water conservation cannot be the goal and responsibility of the States alone. The language of S. 2 makes available to our great State universities and colleges funds with which to establish within each State a water resources research institute, center, or equivalent agency.

In my State of Alaska a water pollution research laboratory is being located at the University of Alaska at College, near Fairbanks. It will be seek to establish how the waters of the Far North can be best put to work. The environmental studies planned within our State will have far-reaching effects in this country and in other lands.

Strange as it may seem to men and women unfamiliar with Alaska and its vast regions, our usable water supply is limited. I remember when U.S. Public Health Service employees examined our water supply and found, in amazement, that many of the streams within the State were polluted with glacial flour. This type of pollution could and does impede the usability of other Alaskan streams.

I doubt if the extent of Alaska's ground water resources will be known in even the near future. Possibly the State

will depend upon its surface waters for most of its water requirements, but certainly these questions cannot be answered until the proper research has determined some of the answers.

In years ahead Alaska will have the industry it seeks today. It will have the investment capital so needed today. It will have increased population. And it will have all the problems these improvements bring.

Dr. William R. Wood, president of the University of Alaska, has examined S. 2 as have members of his faculty. They strongly support this proposed legislation. They believe, as do I, that the program envisaged will complement the work of the U.S. Public Health Service in the Arctic research program which is being developed in the 49th State.

Mr. President, many groups have testified in support of S. 2. I will not attempt to relate their findings in detail, but I do want to mention the statement of Mrs. Haskell Rosenblum, director of the League of Women Voters of the United States, who said:

Efficient utilization and protection of our water supply is so important to national well-being that we think the Federal Government has a responsibility to encourage research in this field, research the need for which has been supported by many eminent scientists and politicians.

The League of Women Voters is non-political. The league does a good job in presenting the pros and cons of important issues to its membership, and it does a responsible job. I applaud the work of the league in the important area of water conservation, and I urge the favorable enactment of this legislation.

Mr. ANDERSON. Mr. President, this amendment directly poses the question of whether the paramount authority is in the Federal Government or the local institutions or centers. It happens that Dr. Jerome B. Wiesner, Director of the Office of Science and Technology, and the Bureau of the Budget, supported an exactly opposite position to that being proposed by the Senator from Colorado. They sought greater Federal authority.

The Hatch Act and this bill both contain sections providing that nothing within the act shall change the relationship between colleges or universities and their States. This act carries that language. The States are jealous of their prerogatives. They should not be over-ridden. But there must be some Federal participation in decisions.

A good many years ago, perhaps in 1945 and 1946 and 1947, the senior Senator from New Mexico worked on an agricultural research bill, which was adopted in 1947. We found at that time, by using a punchcard system, that literally millions of dollars was being spent on projects by States who had no idea that their neighboring States were spending money on similar projects.

We had the problem of dye affecting cotton, not only in the Rain Belt, but also in other places. Research laboratories were working on the problem of how dye worked on cotton grown in desert areas. My State was one of those States. They included New Mexico, Ari-

zona, and California. We were dealing with irrigation cotton, and found that this problem existed there.

These various agencies were not working together, but independently.

As a result of the passage of the Agricultural Research Act of 1947 we were able better to program the money appropriated. We did not interfere with the State programs. We called their attention to what was going on in other areas to solve this problem, and in the solution of which they could participate.

The Hatch Act has been on the books for a long time. By using the language of the Hatch Act in S. 2, we attempt to carry over to the water field the same mutually satisfactory relationship which exists in the agricultural field, which involves a sharing in the decisions as to "advisability" of projects and policies rather than a sharp granting of ultimate authority to one side or the other.

I know that some feel it is advisable to grant this final authority to the States. I believe it would be preferable to have the States and Nation work together, as they have done under the Hatch Act. Furthermore, I do not know of any objection being made to our proposal by any land-grant colleges.

We have not stopped any land-grant college by the exercise of blind authority here in Washington.

There are many examples of how this has worked. The language in the bill is a compromise between two extremes. We have, as Dr. Edwin West Allen has said, set forth a "unique example of national administration in which influence, rather than coercion, is the policy."

That is what should exist. That is why I find myself unable to accept the amendment.

We have had a long history in this field.

This matter has been under the administration of many Secretaries of Agriculture. So far as I know, no land-grant college has ever objected to it, and no land-grant college has suggested that this proposed change should be made. We worked up this bill with the people from land-grant colleges to be sure they were satisfied. As I have said, no land-grant college has suggested that this change should be made. They are satisfied with the way the Hatch Act has worked. They are satisfied with our language in the water resources bill.

Mr. ALLOTT. Mr. President, I had considerable difficulty in hearing the Senator from New Mexico because of the noise in the Chamber. However, I should like to say that his arguments in behalf of his position are not persuasive, to me, at least. They add up to one thing, that we are drafting a bill which is purposely vague, and we are being vague because we do not want to be tied down.

Congress has taken similar action many times, and far too many times in the past few years. Citing the Hatch Act is somewhat analogous, but not completely, because we are dealing here with completely different areas, the areas of water. I believe we have a different type of problem to deal with.

All I want is to be sure of what we are doing when we write this particular sentence:

It shall be the duty of each such institute or center to plan and conduct—

This refers to colleges—
as may in each case be deemed advisable—

And so forth. All I wish is to have language set out in the bill so that we know, from reading the act, who is going to decide whether the action is advisable or not.

If the author of the bill wants the Secretary of the Interior to be the judge of that, let us say so in the bill. I do not want him to be the judge of that. Neither do I want to leave it so vague that the Secretary of the Interior may, by a temporary or permanent withholding of funds, put enough pressure on one or another of the land-grant colleges, so as to dictate the kind of research in water that is going on at a land-grant college.

I spoke at some length yesterday about the importance of the kind of research provided for. It is important. It is particularly important to our States in the West at this particular time. As we progress along in this century, it will be important to every State in the country, except perhaps Alaska, which is not going to be hard pressed on its water problems for some time, and every State will be under the necessity of taking action.

My argument boils down to this: Let us put in the bill what we mean. If we mean that we want the Secretary of the Interior to make the decision, let us put that language in the bill. If we mean that we believe, as I believe, that our land-grant colleges can do a better job of determining the direction of our water research than can the Secretary of the Interior, then let us follow that plan, as I have suggested, that it be left to the decision of the institute or center which has done the job.

Mr. President, I ask unanimous consent that we may have a quorum call without the time being charged to either side.

The PRESIDING OFFICER. Is there objection? The Chair hears none, and it is so ordered. The clerk will call the roll.

The legislative clerk proceeded to call the roll.

Mr. ALLOTT. Mr. President, I ask unanimous consent that the order for the quorum call be rescinded.

The PRESIDING OFFICER. Without objection, it is so ordered.

Mr. ANDERSON. Mr. President, I cannot help agreeing in theory with many of the statements made by the Senator from Colorado. I merely point out that I base my objection to the amendment on the actual operation of the Hatch Act, which is the principal act under which agricultural land-grant colleges have cooperated with the Department of Agriculture. I have never known an instance when the Department of Agriculture and the land-grant colleges have found themselves in really serious opposition on this question. I should like to continue the same basically friendly, cooperative arrangement with

the land-grant colleges, and I believe the proposal will work out in that way. I know that the Secretaries of Agriculture, without exception, have cooperated with the land-grant colleges. I hope that the Secretary of the Interior, whoever he may be, will have the same good sense to do so. Therefore, I oppose the amendment.

Mr. President, I yield back the remainder of my time.

Mr. ALLOTT. Mr. President, I yield back the remainder of my time.

The PRESIDING OFFICER. All time has been yielded back. The question is on agreeing to the amendment.

The amendment was rejected.

Mr. ANDERSON. Mr. President, my attention has been called to a typographical error on page 4, line 23. The first word in line 23 should be "been" instead of "them." The error was made in the printing of the final document. I ask unanimous consent that the first word in line 23, page 4, be changed from "them" to "been."

The PRESIDING OFFICER. Is there objection? The Chair hears none, and it is so ordered.

The bill is open to further amendment.

Mr. ALLOTT. Mr. President, I call up my amendment numbered 49 and ask that it be read.

The PRESIDING OFFICER. The amendment will be stated.

The LEGISLATIVE CLERK. On page 10, beginning at line 7, it is proposed to strike out all through line 20.

Mr. ALLOTT. Mr. President, the purpose of the amendment is to clear away any fuzziness or haziness with respect to the language of the bill. On page 10, line 7, the bill provides:

SEC. 302. The Secretary of the Interior is authorized to establish in the Department of the Interior a Water Resources Service for the purpose of administering programs authorized in this Act.

The subsequent section, section 303, provides, in part:

The Secretary of the Interior is authorized to employ a director of the War Resources Service at civil service grade 18 and, if necessary to obtain personnel competent to administer a program involving scientific knowledge and highly trained staffs, he may employ not to exceed five employees above civil service grade 15 in addition to the number otherwise authorized by law.

The purpose of the amendment is to strike out section 302, which provides for the establishment of a new agency within the Department of the Interior. It also would strike the proviso for the personnel which would staff the proposed agency.

Rarely do I have the support for an amendment which I have for this particular amendment; but I do have good support for it. I refer Senators to page 23 of the report, which was written by the Senator from New Mexico [Mr. ANDERSON]. I shall read in part from a letter written by Philip S. Hughes, Assistant Director for Legislative Reference, Bureau of the Budget, to the then chairman of the Committee on Interior and Insular Affairs, the Senator from New Mexico [Mr. ANDERSON]:

Finally, we believe that provisions of title III with respect to establishment of a Water

Resources Service within the Department of the Interior are unnecessary and undesirable. The Secretary of the Interior now has adequate reorganization authority to take future action if and when he so decides. Furthermore, in view of the general authorization provided in the Postal Service and Federal Employees Salary Act of 1962, special personnel provisions should not be required to staff new constituents of the Department.

That is the position taken by the Bureau of the Budget in its letter to the former chairman of the committee. I believe that in this day and age it is undesirable to continue to add agencies and bureaus to the Department of the Interior. If the Department, with its thousands and thousands of employees, cannot administer a program such as that envisaged by the bill without adding a new agency within the Department, then it had better take a good look at its own organization and do some needed reorganizing. I believe that the Department of the Interior can perform this function with personnel which is either available or can be made available for this work.

I hope the amendment will be accepted, although I have had no indication from the Senator from New Mexico concerning his intentions.

Mr. President, I reserve the remainder of my time.

Mr. ANDERSON. Mr. President, I yield myself 5 minutes.

The Bureau of the Budget, in its reports on S. 3579 and S. 2, recommended the deletion of what are now sections 302 and 303 of S. 2, authorizing a Water Resources Service in the Department of the Interior and five extra-grade jobs for the administration of the water resources research program. This is what amendment 49 would do.

The Bureau of the Budget assures that the Secretary of the Interior has adequate authority to establish such a service, and states that there is sufficient authorization of super-grade jobs in the Postal Service and Federal Employees Salary Act of 1962 so the special provision is not required to provide adequate competent staff.

It is important that we have a single, broadly based, independent office in the Department of the Interior to direct this new program.

The Select Committee on National Water Resources pointed out that many sciences, or disciplines, are involved in the solution of our water problems and urged a broadly based approach to them. The Water Resources Committee of the National Academy of Sciences called for a multidisciplinary approach to water research, and the training of hydroscien- tists with a broad understanding of the many sciences involved. This was also emphasized in the report of the Council for Science and Technology.

There will be both internal and external pressures to assign this new program to one, or several, existing agencies. Each has a limited mission in the water field. They would quite naturally incline any program they can capture toward their own mission. I am not critical of the existing agencies, for if they are worth their salt, they miss no opportunities.

The external pressure to segment the program among several mission-oriented agencies is exemplified in the chamber of commerce recommendation that:

Existing bureaus or services within the Department of the Interior should be assigned the responsibility of administering the program that would be authorized by this legislation.

Such fragmentation would, of course, be a serious mistake. Colleges, universities, and other research agencies would have to shop among the limited-objective agencies with research projects. The multidisciplinary approach we seek would not be attained.

It is equally important that the new agency have a highly competent staff. There is no activity where results from an investment is more directly related to the competence of the men who run the program than in research.

I am reluctant to insist upon statutory provision for a particular service, or office, in the executive branch. The Hoover Commission on Organization of the Executive Branch recommended that organizational structure of the various departments be left to the Secretaries. Congress has gone along with that recommendation.

In view of this precedent, and the assurance that has been given that there will be a competently staffed independent office under existing authorities—I will accept the amendment of the Senator from Colorado.

I will yield back the remainder of my time if the Senator from Colorado will yield back the remainder of his time.

Mr. ALLOTT. Mr. President, I express my appreciation to the distinguished Senator from New Mexico for his willingness to accept the amendment. I believe the amendment is in the best interests of all concerned.

I yield back the remainder of my time.

The PRESIDING OFFICER. All time has been yielded back. The question is on agreeing to the amendment of the Senator from Colorado.

The amendment was agreed to.

Mr. ALLOTT. Mr. President, I offer the amendment which I send to the desk and ask to have read. The amendment has not been printed.

The PRESIDING OFFICER. The amendment will be stated.

The LEGISLATIVE CLERK. On page 7, line 7, after "ascertain," it is proposed to insert "whether the requirements of section 101 have been met."

Mr. ALLOTT. Mr. President, the language of this paragraph has bothered me considerably. I have not been quite certain as to how to attack this particular question. On page 7, commencing with line 5, the bill reads:

On or before the 1st day of July in each year after the passage of this Act, the Secretary of the Interior shall ascertain as to each State whether it is entitled to receive its share of the annual appropriations for water resources research under section 100(a) of this Act and the amount which thereupon each is entitled, respectively, to receive.

What bothers me is that the Secretary of the Interior is required to determine two things: First, he must determine whether any State is entitled to

receive its share; and second, the amount.

The language of my amendment would really place in the hands of the Secretary of the Interior the power to decide whether a land-grant college will receive money; and second, the amount it will receive.

Particularly in view of the fact that in connection with the amendment I offered a few minutes ago—that in regard to who would determine the type of research to be carried on—the Senate purposely decided, I say, to leave this matter vague, therefore I believe it wise that we try to pin down, on page 7, whether we are going to leave in the hands of the Secretary of the Interior, without adequate safeguards, the power to determine whether the colleges will get these funds and the amounts they will get.

My amendment simply inserts in line 7, after the word "ascertain," the following: "whether the requirements of section 101 have been met."

That will subject the Secretary of the Interior to the use of definite criteria for the determination of whether the money shall be given to the colleges, and in what amounts it shall be given. In my opinion, the amendment will greatly strengthen the bill. It will protect the land-grant colleges, and will assure them that there will be definite guidelines—those set out in section 101—which must be followed before the Secretary can determine whether they are entitled to receive the money, and in what amounts.

Mr. President, I reserve the remainder of the time available to me.

Mr. ANDERSON. Mr. President, let me say to the able Senator from Colorado that the amendment takes me a little by surprise, for I did not have a chance to study its language.

I state frankly that I do not know what position I would take in conference, after having a chance to study the amendment. However, on first glance, the language appears to be satisfactory.

So I am inclined to accept the amendment; but I hope the Senator from Colorado will not hold me to insisting on the amendment after we get into conference and confer about the amendment with the other conferees.

Mr. President, I am prepared to yield back the remainder of the time available to me.

Mr. ALLOTT. Mr. President, I thank the Senator from New Mexico. As he knows, I have been worrying about this provision; but until now I have not been able to draw up the necessary language. I think he recognizes, as I do, that a problem does exist.

Mr. ANDERSON. Mr. President, before I yield back the remainder of the time available to me, let me say that I had some language drawn up, as follows:

When it shall appear to the Secretary of the Interior from the annual statement of receipts and expenditures that any portion of the preceding annual appropriation allotted to a State institute or center under this act remained unexpended at the end of the fiscal year, such amount shall be deducted from the next subsequent annual allotment made to the State concerned.

I am told that such a provision is unnecessary, because the Appropriations

Committee will do that very thing. I thought that was what the Senator from Colorado was aiming at.

However, I believe the amendment he proposes is satisfactory; and I will accept it, and hope it will be adopted.

Mr. President, I yield back the remainder of the time available to me.

Mr. ALLOTT. Mr. President, I yield back the remainder of the time available to me.

The PRESIDING OFFICER (Mr. Ribicoff in the chair). All remaining time on the amendment is yielded back.

The question is on agreeing to the amendment of the Senator from Colorado.

The amendment was agreed to.

Mr. ALLOTT. Mr. President, I call up my amendment No. 53, and ask that it be stated.

The PRESIDING OFFICER. The amendment of the Senator from Colorado will be stated.

The LEGISLATIVE CLERK. On page 11 beginning at line 3, it is proposed to strike all through line 13, and to insert in lieu thereof:

SEC. 305. Within two years following enactment of this Act, and annually thereafter, the Secretary of the Interior shall prepare and submit to the President for transmittal to the Senate and House of Representatives a comprehensive report on progress and accomplishments under the Act, together with his recommendations on revisions of the Act, and with the independent recommendations of the governing authorities of the State colleges and universities on desirable revisions.

Mr. ALLOTT. Mr. President, I yield myself 5 minutes.

The PRESIDING OFFICER. The Senator from Colorado is recognized for 5 minutes.

Mr. ALLOTT. Mr. President, we may be able to accomplish a little here. The amendment is a very simple one. It provides that section 305 be amended so that within 2 years after the enactment of this act the Secretary of the Interior shall prepare, and shall submit to the President, for transmittal to Congress, "a comprehensive report on progress and accomplishments under the act."

The original bill provides that shall be done within 6 years. I think that is too long a time for us to wait to find out what progress is being made under this open end authorization. So it is my purpose to provide that the Secretary of the Interior shall make the report within 2 years.

I am told that the objection to the amendment is that the program will not proceed that rapidly. I realize that it will not proceed overnight. However, although we may be able to wait 1 year to see how the program is going, I certainly think that by the end of the second year it should be possible for the Secretary of the Interior to report to us in regard to how the program is going, what progress is being made, what amounts are being spent, what research is being done, and where the research is being done, so that Congress will have a comprehensive picture in regard to all such matters.

Mr. President, I reserve the remainder of the time available to me on this amendment.

Mr. ANDERSON. Mr. President, I do not particularly like the amendment, because many of the State legislatures will not meet for 2 years; and, therefore, the only report the Secretary could make would be that nothing had happened. On the other hand, there would be States as to which he could report what was happening.

I am not opposed to having the reports made. The Secretary of the Interior will have to report. If the Senator from Colorado insists on his amendment, I shall accept it. I say frankly that 2 years is a very short period of time for the land-grant colleges to get tooled up and be able to report. My colleague from New Mexico [Mr. MECHEM] is well acquainted with our State's land-grant college and its president. He and I frequently visit it. It is a fine institution; it has a fine president; and it has a fine faculty and a fine program. But it cannot get tooled up on this program within 2 years. Therefore, a report would be that in less than 2 years nothing significant had been done.

I want the reports made regularly and I want Congress to know all about the work being done and all about the program; and I find that I cannot maintain my desire to have the reports made and still oppose this amendment. Therefore, if the Senator from Colorado insists upon the amendment, I shall accept it.

Mr. ALLOTT. I thank the Senator from New Mexico.

Mr. President, I yield myself 3 minutes.

The PRESIDING OFFICER (Mr. McIntyre in the chair). The Senator from Colorado is recognized for 3 minutes on the amendment.

Mr. ALLOTT. Mr. President, I assure the Senator from New Mexico that I did not offer the amendment facetiously.

Mr. ANDERSON. I realize that.

Mr. ALLOTT. As the Senator from New Mexico has said, I realize that some of the State legislatures will not meet for 2 years. On the other hand, many of the State legislatures are now considering this matter, and many of the legislatures meet each year. Certainly by the end of 2 years the report should be made.

So I am happy to have the Senator from New Mexico accept the amendment; and I yield back the remainder of the time available to me.

Mr. ANDERSON. Mr. President, I yield back the remainder of the time available to me.

The PRESIDING OFFICER. All remaining time has been yielded back.

The question is on agreeing to amendment No. 53 of the Senator from Colorado.

The amendment was agreed to.

The PRESIDING OFFICER. The bill is open to further amendment.

Mr. ALLOTT. Mr. President, I call up my amendment No. 50.

The PRESIDING OFFICER. The amendment of the Senator from Colorado will be stated.

The LEGISLATIVE CLERK. On page 8, beginning at line 9, it is proposed to strike all through line 19, and to insert in lieu thereof:

SEC. 200. There is authorized to be appropriated to the Secretary of the Interior \$5,000,000 in fiscal year 1964, and in each of four fiscal years thereafter, from which he may make grants, contracts, matching, or other arrangements with recipients such as educational institutions, private foundations, or other institutions; with private firms and individuals; and with local, State, or Federal Government agencies, to undertake research into any aspects of water problems indigenous to the area where such recipient is located and not otherwise being studied.

Mr. ALLOTT. Mr. President, on the amendment I ask for the yeas and nays.

The yeas and nays were ordered.

Mr. ALLOTT. Mr. President, I can discuss the amendment in the same context as I would two other amendments that I have offered. One relates to section 100(a) and the other relates to section 100(b).

Section 200, to which the amendment relates, should be in the RECORD at this point, so I shall read it:

SEC. 200. There is authorized to be appropriated to the Secretary of the Interior \$5,000,000 in fiscal year 1964, increasing \$1,000,000, annually for five years, and continuing at \$10,000,000 annually thereafter from which he may make grants, contracts, matching, or other arrangements with educational institutions, private foundations, or other institutions; with private firms and individuals; and with local, State, or Federal Government agencies, to undertake research into any aspects of water problems related to the mission of the Department of the Interior, which may be deemed desirable and are not otherwise being studied.

My amendment provides as follows:

SEC. 200. There is authorized to be appropriated to the Secretary of the Interior \$5,000,000 in fiscal year 1964, and in each of four fiscal years thereafter—

Otherwise, the limitations of the section remain the same.

What is the basic difference between the amendment and the bill? There are two simple, basic differences. First, we would give the Secretary of the Interior, not \$10 million at this time, but \$5 million. We would give him \$5 million for undertaking research, grants, and matching research grants with private funds and individuals and, in fact, with anyone with whom the Secretary might wish to make a contract.

This sort of thing has gone pretty far. We are now at the place at which any activity which has the word "research" tacked onto it can receive almost any amount of money that is needed. I have seen all sorts of activities entitled "research" which required no more ability or energy than a man with an adding machine and a pair of eyes with which to read.

The issues are as follows:

First, we would reduce the amount authorized from \$10 to \$15 million.

Second, as written, the bill would be an open end authorization. We would start at \$5 million, adding \$1 million a year until we reached \$10 million, and then we would authorize the appropria-

tion of \$10 million, not for 1 year, not for 5 years, and not for 10 years, but forever.

Research into water problems is a sensitive area. It is extremely important to some of us. But as a principle of legislation I do not believe that there should be an open end authorization in this type of activity.

I said yesterday, and I repeat today, that I believe the best results from any provision of the bill will come not from the Department of the Interior or any contract that it might make, but from the work which is done by those in our land-grant colleges who are skilled in water research matters. The bill would provide an open end authorization, until Congress should decide to act otherwise, authorizing the sum of \$10 million, starting with the sum of \$5 million for the first year, and increasing by \$1 million each year for 4 years thereafter to \$10 million, and from then on the authorization would be \$10 million a year.

We shall receive reports. I believe that the best way to approach the question of research is to limit the time that we would appropriate the money. At the end of 5 years, if the program is paying off in real research and accomplishments, we shall have no trouble in Congress in passing another authorization bill, not for \$10 million, but for \$20 million, if that amount is needed. If the population explosion continues, and pressure is exerted against the people who require water, it will have to be obtained, no matter what the cost. So let us take a look at the program.

This is an argument of sound reasoning. Let us authorize an appropriation of \$5 million to the Secretary of the Interior for 5 years, and at the end of 5 years let us examine the situation and decide what we want to do. I am sure that if the money is used wisely and if the research program pays off, there will be no difficulty in passing a new authorization bill.

Mr. President, I reserve the remainder of my time.

Mr. ANDERSON. Mr. President, I yield myself 10 minutes.

As the Senator from Colorado has pointed out, the amendment would do three major things:

First, it would reduce the title II program to a straight \$5 million a year; second, it would terminate the program in 5 years; and third, it would change the limitation on research projects from water problems "related to the mission of the Department of the Interior" to problems "indigenous to the area where such recipient is located."

I cannot accept the amendment because of the damage it would do to the bill. All three of the changes would have extremely undesirable results.

First, water resource problems are so pressing and urgent, and the need for training hydrosciences so great, that no one has previously questioned the sums provided in S. 2. This includes the Chamber of Commerce of the United States, which has stated in a letter to committee members:

Additional research, investigations and experiments in the field of water and related resources are needed to help meet the water demands of future generations. The training of additional scientists to conduct such activity is vital. The stimulation of more effective research at industrial, State and local levels and the training of additional scientists by the State and other agencies are the most satisfactory methods of achieving greater knowledge about water because they would minimize unwarranted Federal research activity * * *.

The chamber did recommend amendments—but a reduction in the sums proposed in S. 2 was not suggested.

It is anticipated that a large portion of S. 2 funds will be matched. The appropriations authorized in S. 2 were set at a modest original level, moving upward for 4 or 5 years to keep pace with available matching funds. The appropriation of a flat sum for 5 years will deter and put a lid on the potential flow of matching funds. In agricultural research, matching funds very considerably exceed Federal appropriations.

Therefore, I must oppose the amendment on that basis.

Second, the inclusion of a termination provision in the bill would kill its most important value.

As evidence in support of that point, I shall read a portion of a letter which I received from Colorado State University, Fort Collins, Colo., dated April 18, 1963. It is a letter from the president of the college, commenting on chamber of commerce suggestions, in which he said:

The proposal to put a termination date on section 100 programs would defeat the very purpose of the bill. Sections 104 and 305 insure periodic review of the programs. Surely these requirements plus the continuing concern of the Congress as it considers appropriations annually will provide ample safeguard against deterioration of value of the research undertaken by section 100 funds.

Further, colleges and universities cannot afford to build and equip laboratories and rearrange curricula to accommodate a short-term program. Top scientists in disciplines related to water resources—physics, engineering, geology, botany, silviculture, meteorology, economics and many others—are not easily persuaded to specialize in water problems if there is the threat of early termination of the principal program in the field. They look for specialties in which they may find a lifetime career. Neither can students be persuaded to spend many years in graduate training for work which may be stopped before they complete their training. The assurance of continuity which S. 2 provides is one of the basic strengths of the bill. Provision is made at section 305 for a comprehensive review at the end of 5 years. Congress can itself review the results of the program whenever it deems it appropriate. The adoption of this suggestion would, in our judgment, be especially injurious to the bill.

Dr. Morgan is as right as he can be in his appraisal of the proposal. I think it would completely kill the bill.

Colleges and universities cannot tool-up—they cannot afford to build and equip laboratories, for a short-term program. Faculty members looking for a field in which to specialize are not looking for an odd-job business, but something in which they will find a lifetime

career, worth years of study and preparation. Students would not spend years in training for work that may be terminated before they graduate. Congress may review and reenact the program.

The bill provides for a 5-year review, and we have amended that to 2 years. But schools and scientists are not going to commit their assets and their lives to a program authorized on a short-term basis.

S. 2 originally handled the situation by providing at section 305 that within 1 year after the 5th year of operation, the Secretary of the Interior shall make a review report and submit it to the President and Congress, together with the independent views of college and university heads. Those are to start in 2 years now.

Reviews will be made. Everyone is under notice that results are expected. But there is no threat of termination in S. 2 and there should not be. Water problems will be with us for a long time to come and we must have a water research program just as long as water is necessary to human existence on the planet.

Therefore, because of this second provision I must oppose the amendment.

The limitation of research projects to "mission of the Department of Interior" was to keep, and to reassure other Federal Departments, that the Department of Interior would be kept, in its own water fields. That is needed and should not be stricken from the bill.

The substitute limiting phrase, "indigenous to the area where such recipient is located" would have a very serious effect.

The phrase has a definite implication that the local agencies are to work on the practical problems in their locality. Perhaps some will involve basic research, but the whole pressure of the phrase will be away from fundamentals toward practical research.

This tendency became a serious problem at one period in the development of the agricultural research program and led to the enactment of the Adams Act of 1904, broadening the language of the original act and providing an extra \$15,000 annually of funds. Federal Director A. C. True of the Office of Experiment Stations wrote, in 1902:

Under present conditions it is useless to expect that * * * our stations will discover many of the new principles on which permanent improvement of our agriculture must rest. But unless the way is opened for them to seriously attack these fundamental problems their future work will necessarily be comparatively fragmentary and inconclusive. They may, as in the past obtain many results which can usefully be applied in practice, but they will not be able to furnish solid foundations for the enlargement of our agricultural industries.

Harvard University is doing a tremendously big job of setting up a computer system to analyze multiple-purpose river basin plans, and thereby speed the adoption of plans that maximize benefits. Once perfected, the computer system could be used over and over at Harvard for the many river basins of the Nation—but not if Harvard were limited to work indigenous to its area.

The Corps of Army Engineers has a big experimental laboratory at Vicksburg which builds scale models of dams, spillways, and even rivers to test engineering plans and dam designs. They have a model of the Mississippi River, of New York Harbor, and dams to be built all over the Nation. They could not concentrate in this one station—at great savings—this sort of research and experimental work if limited to problem "indigenous to the area."

The scientists now tell us that Texas droughts are the result of the fact that storms which develop in the Aleutians and Bay of Alaska and sweep south to cross the United States from east to west, remain too far north for an extended period to cause rainfall in the Lone Star State. They are studying ways to coax these storms, or major weathermakers, to go over areas where water is needed. The problem becomes how Texas—and New Mexico—can do research on weather problems of utmost importance to the Southern States up in Alaska, or Montana.

These examples are not necessarily in the fields with which Interior Department could or should concern itself, but they illustrate the danger of the "indigenous problems" limitation proposed by the amendment.

I hope that the amendment will be defeated.

Mr. ALLOTT. Mr. President, I yield 3 minutes to the distinguished Senator from Nebraska [Mr. HRUSKA].

Mr. HRUSKA. Mr. President, I rise in support of the amendment offered by the Senator from Colorado, which has been under discussion.

By way of preface I wish to say that I am a cosponsor of the measure. I spoke at length upon it here on the Senate floor and I testified before the committee in favor of the bill.

I again congratulate and commend the chairman of the committee, the Senator from New Mexico [Mr. ANDERSON] for the splendid job which has been done on the bill. It is a constructive piece of legislation. It follows a proven procedure and will prove to be easily workable.

I do endorse the legislative principle involved here, which is to have as important a piece of legislation as this returned to the Congress periodically, not for affirmative action, but for review and reconsideration, so that we may make such changes as may be indicated after 4 or 5 years of experience.

I think that would have a salutary effect upon those who are granted funds to administer this bill. It would make them a little more alert. It would cause them to be more vigilant and more determined to develop proper programs, and more responsive in their efforts to get from their programs the maximum benefit.

It is just good legislative procedure, it seems to me, to provide for congressional review.

The point has been raised that it is necessary to have a permanent program. Otherwise, it is contended, technicians and faculty would not agree to commit themselves to something that is not as-

sured to last forever and a day. It seems to me there is nothing in the provision for a 5-year review which would militate against the permanence of this kind of work for teachers, professors, or technicians. While they may not be pursuing their work under the particular auspices set up by this bill, there is in this country, and there will continue to be, wide demand for that type of development and achievement.

I wish to say again that the legislation is good. It is sound, and it should be approved. But I think it would be improved if we added an amendment, providing for review by the Congress, which would follow if the Allott amendment were adopted. I hope it will be.

Mr. ALLOTT. Mr. President, I yield myself 5 minutes.

I want to express my appreciation to the distinguished Senator from Nebraska for his support of the amendment. I am sure everyone in this body is aware of the great sincerity with which he approaches this type of problem. His own State is as aware of water problems as my own.

I can see that there are persons who want to see the present provision for the money kept in the legislation and see it go on and on, but it seems to me that as legislators the only sensible thing we can do is place this legislation in a position where we know Congress is going to have a review.

It is estimated that there will be 250 million people in this country before 1970. The pressures for an adequate supply of water are going to get greater and greater all the time. The problem is not going to be solved overnight. Of all the problems we have, the problem of water is probably going to be the greatest and the one which is going to be with us the longest. It may get worse. There may come a time when people may have to move to other places, and perhaps outside the bounds of this country, in order to find water. I do not know. Nobody can foresee. But one thing is sure, and that is that the pressures for water use are going to increase, and we are going to have to make better use of that commodity.

With such a situation facing us, nobody under heaven could keep the research program from being continued 5 years from now, if the research people made good use of the money appropriated, if the money was used correctly, if real research was being performed, and not merely a bunch of boondoggling contracts. If research was being done, there is no question that the law would be reenacted. Let us provide legislation so that Congress can reevaluate it at the end of 5 years, instead of starting off on a program that will go on and on, and, by reason of the fact that it will go on and on, Congress would have to repeal the law in order to do anything about it. We should limit the law now, rather than later.

I do not know whether the distinguished Senator from New Mexico proposes to speak further at this time.

I yield to the Senator from Hawaii [Mr. Fong] 3 minutes.

Mr. FONG. Mr. President, I am in hearty accord with the amendment proposed by the distinguished Senator from Colorado. It is a worthwhile amendment. I am sure if the money is spent wisely, under the amendment before the Senate, Congress will continue the program and reenact this legislation.

As a cosponsor of S. 2, I am pleased and privileged to give wholehearted endorsement to this important proposal. It is a measure that has been carefully studied and drafted to cope significantly with a national problem.

S. 2 is designed to establish water resources research centers at land-grant colleges, universities, and centers of competence, and to promote a more adequate national program of water research. The bill authorizes funds starting at \$75,000, and increasing to \$100,000 annually, to a land-grant institution of each State for a water research center. In addition, other appropriations would be authorized to match State funds and to provide the Secretary of the Interior with money for expanded water research.

Exhaustive studies have amply confirmed the acuteness of water supply needs. We are facing, not a theoretical problem, but a real and growing crisis across the Nation. Projections of available water resources and anticipated needs in the coming decades underscore the already developing seriousness of water shortages in many areas today. They foretell a far grimmer picture for the future.

So we are not discussing now the reasons for this legislation. The need for it is plain for all to see; the record is clear on this score. We are, or should be, concerned more with the means and methods for achieving the broad purpose of S. 2: to assure an abundance of water, both in quantity and quality. The question is, to help achieve this end, How can we best stimulate research, investigations, and experimentation in the field and also encourage the training of needed scientists through assistance to colleges and universities?

S. 2 is soundly patterned after the very successful agricultural experiment station program, the Hatch Act of 1887. The outstanding results of this time-tested program enhance the desirability of having land-grant institutions administer water resources research, as provided in S. 2. Through this Federal-State approach, needed Federal support can be made available for water research by land-grant institutions, and other designated research institutions—research that would be responsive to both local and national needs.

Speaking for the State of Hawaii, I can state emphatically that we place great importance upon water research. Like the Nation as a whole, Hawaii has experienced an increase in demand for water from the greater per capita demand as well as the greater number of people. We are intensifying our efforts to expand and diversify our island economy. Both urban and suburban development, and the agricultural potential of Hawaii, will depend heavily upon our ability to increase and conserve our water resources.

Dr. Thomas Hamilton, president of the University of Hawaii, has described our water research needs as pressing and requiring local research. We have been limited by lack of funds rather than by lack of interest or lack of problems to work on, according to Dr. W. J. Holmes, dean of the University of Hawaii, College of Engineering. Dean Holmes points in Hawaii's problem when he states:

If anything serious happens to our basal water supply, the population that Hawaii can support will be most seriously reduced.

There are other facets of a total water research program beyond that encompassed by S. 2, but this bill goes far toward coming to grips with a national problem.

Time is on our side if we move aggressively toward the objective set forth in S. 2. I urge my colleagues to act promptly and decisively to approve this important measure.

Mr. ANDERSON. Mr. President, I yield 5 minutes to the able senior Senator from California [Mr. KUCHEL].

Mr. KUCHEL. Mr. President, I find it somewhat difficult to oppose the pending amendment, for I think, as a general rule, the Congress of the United States ought, by the type of legislation it writes, provide for periodic scrutiny of the intent for which legislation is passed and the manner in which the administrative or executive branch in the Government has performed its duty.

In this instance, however, I make an exception. I come from a State which I think deserves the applause of the people of the country for what it has done to try to set its own house in order with respect to an adequate water supply. California does not have within its borders sufficient water to meet its growing needs. The people of my State at the local level and at the State level have sought to remedy this deficit. Two years ago, the people of California bonded themselves in a statewide election for the first phase of the State water plan for an extraordinary amount of money, some \$1,750 million.

There has hardly been a year when I have not come before the Senate asking for additional assistance in an effort to help the people of my State, now and hereafter, to have a continuing water supply. True, the money is repayable into the U.S. Treasury by the water users.

The outlook for an adequate supply of water is somewhat bleak. Here we not only have an opportunity to enlist the aid of educational institutions in all 50 States, but, as was said by one of our State's leading educational and research administrators who testified before our committee on behalf of the University of California, it is quite possible that breakthroughs with respect to the problems of an adequate supply of water could take place in your State, Mr. President, or in one of the Eastern States, where the problem of an adequate water supply is not so acute.

I believe, therefore, in this instance, if I make a mistake, I wish to make a mistake on the side of giving the educational

institutions of America a greater opportunity to study and to conduct research and to try to find ways and means by which potable water in this country can cope with the population explosion which we face in the days to come.

Therefore, having placed my name on the bill as a coauthor, and having been very glad to accept some of the amendments that have been offered by my very able colleague in the Senate from Colorado, in this instance I feel that by remaining silent I would not discharge my duty if I did not say to the Members of the Senate that I believe the continuing policy of the Government of the United States as enunciated in the proposed legislation is in the public interest. For that reason I must oppose the amendment.

Mr. ANDERSON. Mr. President, I wish to call attention to the fact that under the terms of the bill the Secretary of the Interior will have to return to Congress every year for an evaluation. The Senator from Nebraska said that he should return to Congress for an authorization. He will have to do so, in effect, at every appropriation hearing.

We know what would have happened if Congress, when it passed the Hatch Act of 1877, had written in a provision for the filing of a report every 5 years. Does anyone undertake to say how long it would have been before someone would have come in with an antidiscrimination rider and destroyed that act, as they have destroyed housing?

The Hatch Act was originally drawn to permit schools to do experimental work as long as they were doing useful work.

Reference was made to boondoggling contracts. I have examined hundreds of contracts in person—perhaps thousands of them—submitted by land-grant colleges, and I have never seen one boondoggle contract of a land-grant college.

The Senator from Colorado has referred to Chancellor Aldrich, of the University of California, who testified before our committee in favor of the very things that we propose. I should like to read from a letter which has been sent to me by the president of the University of Florida, Dr. J. Wayne Reitz. He wrote to me on April 15, 1963. He says, in connection with amendments to be proposed by the chamber of commerce, including the very amendments offered by the Senator from Colorado:

3. It is suggested by the chamber of commerce that title I should provide a definite termination date of the program of annual grants of funds to the States. Here again the basic assumption is made in S. 2 that water research is going to be a continuing and increasingly important area of investigation if we are to meet the needs of our ever-growing population for personal as well as agricultural and industrial consumption. To establish a definite termination date would mitigate against a State developing sound and farsighted programs of research in this important field. Had termination dates been provided for agricultural research we would never have made the progress that has been made.

I agree with him—a thousand percent.

Then, at the end of the letter he says:

I fear that the chamber of commerce in attempting to amend the bill is in effect trying to kill it, notwithstanding its announced support. Certainly if the bill were amended as suggested by the chamber it would be so far from the mark that it might as well be killed.

I appeal to the Senate not to destroy a longstanding piece of work, of negotiations between land-grant colleges, and departments of Government and Congress, because it may well result in killing a good bill that would work. I believe it would be a workable act. These people would have to come back regularly for appropriations. There would be provision for review, just as there is now provision for review under the Hatch Act, which has stood since 1877.

I hope that the amendment will be defeated.

Mr. ALLOTT. Mr. President, I yield myself 5 minutes. I thank the distinguished Senator from Hawaii for his remarks. Both he and the distinguished Senator from Nebraska realize the importance of the bill, and are cosponsors of it. Therefore their support of the principles of the bill and the principles of my amendment are indeed encouraging.

I particularly wish to thank the distinguished Senator from Hawaii, because we are prone to think of the State of Hawaii as one of those lush paradises in which water is never a problem. Yet of my own personal knowledge I know that that distinguished Senator from Hawaii carried through in the Committee on Interior and Insular Affairs, and also through the Senate, and through the Congress, a reclamation project which will add greatly to the total agricultural wealth of Hawaii, and enable it to stabilize its agricultural economy.

Few people could see the necessity of this in a place like Hawaii, because their ideas are entirely different. However, as the result of his foresight and his thinking, the agricultural economy of one area of his State is going to be stabilized by more advantageous use of water.

I should like to say to my distinguished friend from New Mexico, first, that he has taken two things out of context in my remarks; at least there is the implication that they are out of context. I wish to get the record straight about that first. He quoted from a letter from Dr. Morgan, who is the very capable and distinguished head of our Colorado State University. In that letter, Dr. Morgan referred to the program under section 100.

The amendment I am proposing has nothing whatever to do with section 100. It has nothing to do with grants to land-grant colleges. Let us make that clear. That problem does not exist.

The Senator from New Mexico also said that we should never consent to a land grant college boondoggling on its research grants. No one on this floor has said that they did. Since I am the only one that I know of who has used the word "boondoggle" on the floor in the last hour or two, I must separate the word "boondoggle" from anything having to do with land-grant colleges.

However, I am not afraid to say on the floor of the Senate that we have department after department in the Government of the United States who are boondoggling with so-called research contracts.

I documented that on the floor of the Senate last year. I documented one instance in which the National Science Foundation had done just such a thing, and had made a hopeless shambles out of what should have been one of the great primary basic research projects of this age.

I shall document it again within the next week on the floor of the Senate, to show exactly what is happening. It is no secret any longer that the National Institutes of Health have so far outgrown so-called research programs, that many of them would be strained to have them called research programs.

A man with a pencil or an adding machine could do most of the research involved, so far as most of it being carried on in this country is concerned. When I see research being carried on by research teams, under the National Institutes of Health with respect to small indigenous tribes, I wonder what we are spending our money for, especially when we are chalked up with a \$12 billion deficit this year. I want to keep the record straight.

I am sure the Senator from New Mexico did not mean to imply that I thought colleges were boondoggling. However, I wish to make it perfectly clear that in my references I meant to say that I do not have the confidence in the Secretary of the Interior that I have in our colleges and universities throughout the country so far as conducting research in water is concerned.

Perhaps the Senators are ready to give the Secretary of the Interior \$5 or \$10 million forever in the hope that he will conduct a meaningful research program. I am not willing to do so. I do not have that much confidence in the present Secretary of the Interior, and I doubt whether I would have that much confidence in any Secretary of the Interior.

The statement has been made in the Senate that Congress would review the program when appropriations for it were under consideration. But the review should not be made by the Committee on Appropriations; it should be made by those who, day after day, year after year, work in the areas of water resources, land utilization, reclamation, and conservation, in the legislative committee, which is the Committee on Interior and Insular Affairs. That is the committee in which policy should be made as to whether this program shall be continued forever and ever, ad infinitum, or whether it should be limited. If that is not a reasonable suggestion, then I know of no suggestion that could be reasonable.

Congress should place a limitation on the amount of money which the Secretary of the Interior can contract with land-grant colleges for research, or so-called research. Therefore, I have suggested that the amount be limited to \$5 million, and the duration of the act be limited to 5 years. I believe that is a wholly reasonable suggestion.

Mr. President, I ask unanimous consent that there may be a quorum call, the time for the quorum call not to be charged to either side.

The PRESIDING OFFICER. Is there objection to the request of the Senator from Colorado? The Chair hears none, and the clerk will call the roll.

The legislative clerk proceeded to call the roll.

Mr. ALLOTT. Mr. President, I ask unanimous consent that the order for the quorum call be rescinded.

The PRESIDING OFFICER. Without objection, it is so ordered.

Mr. ALLOTT. Mr. President, if the Senator from New Mexico is prepared to yield back the remainder of the time available to him on the amendment, I am prepared to yield back the remainder of the time available to me, inasmuch as I have not received requests for further time.

Mr. ANDERSON. Mr. President, I yield back the remainder of the time available to me.

Mr. ALLOTT. Mr. President, I do likewise.

The PRESIDING OFFICER. All remaining time on the amendment has been yielded back.

The question is on agreeing to the amendment of the Senator from Colorado. On this question, the yeas and nays have been ordered; and the clerk will call the roll.

The legislative clerk called the roll.

Mr. SMATHERS. I announce that the Senator from Nevada [Mr. BIBLE], the Senator from Connecticut [Mr. DODD], the Senator from Minnesota [Mr. HUMPHREY], the Senator from North Carolina [Mr. JORDAN], the Senator from Tennessee [Mr. KEFAUVER], the Senator from Washington [Mr. MAGNUSON], and the Senator from Arkansas [Mr. McCLELLAN] are absent on official business.

I further announce that, if present and voting, the Senator from Nevada [Mr. BIBLE], the Senator from Connecticut [Mr. DODD], the Senator from North Carolina [Mr. JORDAN], the Senator from Tennessee [Mr. KEFAUVER], and the Senator from Washington [Mr. MAGNUSON] would each vote "nay."

On this vote, the Senator from Minnesota [Mr. HUMPHREY] is paired with the Senator from Maryland [Mr. BEALL]. If present and voting, the Senator from Minnesota would vote "nay," and the Senator from Maryland would vote "yea."

Mr. KUCHEL. I announce that the Senator from Kentucky [Mr. MORTON] is necessarily absent.

The Senator from Maryland [Mr. BEALL] is detained on official business.

On this vote, the Senator from Maryland [Mr. BEALL] is paired with the Senator from Minnesota [Mr. HUMPHREY]. If present and voting, the Senator from Maryland would vote "yea," and the Senator from Minnesota would vote "nay."

The result was announced—yeas 30, nays 61, as follows:

[No. 60 Leg.]

YEAS—30

Allott	Fong	Pearson
Bennett	Goldwater	Prouty
Boggs	Hickenlooper	Proxmire
Byrd, Va.	Hruska	Robertson
Carlson	Javits	Saltonstall
Cooper	Jordan, Idaho	Simpson
Cotton	Keating	Thurmond
Curtis	Lausche	Tower
Dirksen	Mechem	Williams, Del.
Dominick	Miller	Young, N. Dak.

NAYS—61

Alken	Hartke	Mundt
Anderson	Hayden	Muskie
Bartlett	Hill	Nelson
Bayh	Holland	Neuberger
Brewster	Inouye	Pastore
Burdick	Jackson	Pell
Byrd, W. Va.	Johnston	Randolph
Cannon	Kennedy	Ribicoff
Case	Kuchel	Russell
Church	Long, Mo.	Scott
Clark	Long, La.	Smathers
Douglas	Mansfield	Smith
Eastland	McCarthy	Sparkman
Eastmondson	McGee	Stennis
Ellender	McGovern	Symington
Engle	McIntyre	Talmadge
Ervin	McNamara	Williams, N.J.
Fulbright	Metcalf	Yarborough
Gore	Monroney	Young, Ohio
Gruening	Morse	
Hart	Moss	

NOT VOTING—9

Beall	Humphrey	Magnuson
Bible	Jordan, N.C.	McClellan
Dodd	Kefauver	Morton

So the amendment was rejected.

Mr. ANDERSON. Mr. President, I move to reconsider the vote by which the amendment was rejected.

Mr. SPARKMAN. Mr. President, I move to lay that motion on the table.

The PRESIDING OFFICER. The question is on the motion of the Senator from Alabama.

The motion to lay on the table was agreed to.

Mr. COTTON. Mr. President, I offer the amendments which I send to the desk, and ask to have stated.

The PRESIDING OFFICER. The amendments of the Senator from New Hampshire will be stated.

The LEGISLATIVE CLERK. On page 3, line 19, it is proposed to strike out "\$1,000,000" each time it appears and insert in each case "\$800,000".

On page 3, line 20, it is proposed to strike out "\$5,000,000" and insert "\$4,000,000".

On page 8, line 10, it is proposed to strike out "\$5,000,000" and insert "\$4,000,000".

On page 8, line 11, it is proposed to strike out "\$1,000,000" and insert "\$800,000".

On page 8, line 12, it is proposed to strike out "\$10,000,000" and insert "\$8,000,000".

Mr. COTTON. Mr. President, in view of the fact that the amendments would merely reduce the authorizations, with the exception of the authorization for land-grant colleges, by 20 percent, I ask unanimous consent that the amendments be considered en bloc.

The PRESIDING OFFICER. Is there objection to the request of the Senator from New Hampshire? The Chair hears none, and it is so ordered.

How much time does the Senator from New Hampshire yield to himself?

Mr. COTTON. I yield myself 5 minutes.

Mr. President, I ask for the yeas and nays on the amendments.

The yeas and nays were ordered.

Mr. COTTON. Mr. President, the amendments considered en bloc would merely reduce by 20 percent—by one-fifth—the authorization in the bill, with the exception of the authorization for research in the case of land-grant colleges. They would not in any other respect affect the planning, the term, or the bill.

On a long-term basis S. 2 would authorize a \$20-million-a-year program of water research activities under the supervision of the Department of the Interior. The amendments would reduce the total scope of the program to \$17 million a year on the long-term basis, and make corresponding reductions in the earlier phases of the program.

There are several reasons for the amendment:

First, this is a new program. The extent of State participation, the ability of the States to finance additional water research, and the availability of research personnel are all relatively unknown factors at this time. A modest reduction such as this proposal will not thwart the program, nor will it hamper it in any way.

I ask the attention of Senators especially to the following point:

Second, the Federal Government is already spending sizable sums on water research. The Federal Council for Science and Technology has calculated that eight major agencies of the Federal Government are already engaged in this research. They are: Agriculture, Commerce, Defense—chiefly Corps of Engineers—HEW, Interior, AEC, National Science Foundation, and TVA. In fiscal 1963, these Federal water research programs will involve expenditures of more than \$66 million, and the budget requests for fiscal 1964 exceed \$74 million. Thus a modest cut in the amounts in S. 2 will not reduce the Government's efforts in this field, but only slow down the rate of increase by a small amount. Its chief effect would be simply to channel the research efforts into the most important and most productive fields.

Mr. President, this is a good bill. The purpose of the bill is good. It has long been the position of the Senator from New Hampshire that our water resources and our water supplies represent the unfinished business of our generation.

Simply because we in my section of the country are not faced with quite the same emergency faced by other sections does not lessen my enthusiasm for this program, which is a thoroughly legitimate Federal activity.

But, Mr. President, the general fiscal and budget picture of the Government urgently demands at this time the utmost economy.

The PRESIDING OFFICER. The time the Senator yielded has expired.

Mr. COTTON. Mr. President, I yield myself 3 additional minutes.

The PRESIDING OFFICER. The Senator from New Hampshire may proceed for 3 additional minutes.

Mr. COTTON. Mr. President, the committee in its report indicated it did not attempt to coordinate the activities; that that was to be left to the executive branch of the Government—and no doubt properly so.

We are conducting all these activities simultaneously. The bill would add a new one. I think the people of this country—who are watching with care the efforts of the Congress to show its disposition to hold down, so far as can be done without serious damage to vital programs, the authorizations for expenditures in the coming years—would look with favor upon this modest reduction.

Mr. ALLOTT. Mr. President, will the Senator yield for a question.

Mr. COTTON. I yield with pleasure to my friend from Colorado.

Mr. ALLOTT. Since the amendment offered by the Senator is not printed, do I correctly understand the effect of the amendment would be not to cut the amounts to be available to land-grant colleges under section 100(a), but only to cut those amounts in subsection 100 (b) and section 200 which would go to the Secretary of the Interior?

Mr. COTTON. The Senator from Colorado is completely correct in his analysis of the amendment. I repeat that the amendment would leave untouched the authorization of amounts available for research for land-grant colleges. It would cut all along the line by 20 percent the other authorizations in the bill available to the Secretary of the Interior, and to be expended in accordance with the terms of the bill.

Mr. ALLOTT. With that answer I wish to tell the Senator I shall be much pleased to join him in his amendment, particularly since the Senate did not adopt the amendment offered a few minutes ago to limit the authorization to 5 years.

Mr. COTTON. I thank the Senator for his support of my amendment. I am disappointed that the Senator's amendment was not agreed to; but this would be a more modest reduction, and I hope the Senate will act favorably upon it.

Mr. President, I reserve the remainder of my time.

Mr. ANDERSON. Mr. President, I have no wish to detain the Senate on this amendment. It is a question of seeking to reduce a carefully worked out bill, a carefully worked out proposal, passed upon by educators all across the country. I hope the amendment will be defeated.

Mr. President, I yield back the remainder of my time.

Mr. COTTON. Mr. President, I yield back my remaining time.

The PRESIDING OFFICER. All time has been yielded back. The question is on agreeing to the amendment offered by the Senator from New Hampshire [Mr. COTTON]. On this question the yeas and nays have been ordered, and the clerk will call the roll.

The legislative clerk proceeded to call the roll.

Mr. DIRKSEN (when his name was called). On this vote I have a pair with the distinguished assistant majority leader [Mr. HUMPHREY]. If he were

present and voting, he would vote "yea." If I were at liberty to vote, I would vote "nay." I withhold my vote.

The rollcall was concluded.

Mr. SMATHERS. I announce that the Senator from Nevada [Mr. BIBLE], the Senator from Connecticut [Mr. DODD], the Senator from Minnesota [Mr. HUMPHREY], the Senator from North Carolina [Mr. JORDAN], the Senator from Tennessee [Mr. KEFAUVER], the Senator from Washington [Mr. MAGNUSON], and the Senator from Arkansas [Mr. McCLELLAN] are absent on official business.

I further announce that, if present and voting, the Senator from Nevada [Mr. BIBLE], the Senator from North Carolina [Mr. JORDAN], the Senator from Tennessee [Mr. KEFAUVER], and the Senator from Washington [Mr. MAGNUSON] would each vote "nay."

On this vote, the Senator from Connecticut [Mr. DODD] is paired with the Senator from Colorado [Mr. DOMINICK]. If present and voting, the Senator from Connecticut would vote "nay," and the Senator from Colorado would vote "yea."

Mr. DIRKSEN. I announce that the Senator from Colorado [Mr. DOMINICK] and the Senator from Kentucky [Mr. MORTON] are necessarily absent.

The Senator from Maryland [Mr. BEALL], the Senator from Nebraska [Mr. CURTIS], and the Senator from California [Mr. KUCHEL] are detained on official business.

If present and voting, the Senator from Nebraska [Mr. CURTIS] would vote "yea."

On this vote, the Senator from Maryland [Mr. BEALL] is paired with the Senator from California [Mr. KUCHEL]. If present and voting, the Senator from Maryland would vote "yea," and the Senator from California would vote "nay."

On this vote, the Senator from Colorado [Mr. DOMINICK] is paired with the Senator from Connecticut [Mr. DODD]. If present and voting, the Senator from Colorado would vote "yea," and the Senator from Connecticut would vote "nay."

The result was announced—yeas 29, nays 58, as follows:

[No. 61 Leg.]

YEAS—29

Aiken	Hickenlooper	Proxmire
Allott	Hruska	Robertson
Bennett	Jordan, Idaho	Saltonstall
Boggs	Keating	Scott
Byrd, Va.	Lausche	Simpson
Carlson	McIntyre	Talmadge
Cooper	Mechem	Thurmond
Cotton	Miller	Tower
Fong	Pearson	Williams, Del.
Goldwater	Prouty	

NAYS—58

Anderson	Hartke	Mundt
Bartlett	Hayden	Muskie
Bayh	Hill	Nelson
Brewster	Holland	Neuberger
Burdick	Inouye	Pastore
Byrd, W. Va.	Jackson	Pell
Cannon	Javits	Randolph
Case	Johnston	Ribicoff
Church	Kennedy	Russell
Clark	Long, Mo.	Smathers
Douglas	Long, La.	Smith
Eastland	Mansfield	Sparkman
Edmondson	McCarthy	Stennis
Ellender	McGee	Symington
Engle	McGovern	Williams, N.J.
Ervin	McNamara	Yarborough
Fulbright	Metcalf	Young, N. Dak.
Gore	Monroney	Young, Ohio
Gruening	Morse	
Hart	Moss	

NOT VOTING—13

Beall	Dominick	Magnuson
Bible	Humphrey	McClellan
Curtis	Jordan, N.C.	Morton
Dirksen	Kefauver	
Dodd	Kuchel	

So Mr. COTTON's amendment was rejected.

Mr. MILLER. Mr. President, I send an amendment to the desk and ask to have it stated.

The PRESIDING OFFICER. The amendment offered by the Senator from Iowa will be stated.

The LEGISLATIVE CLERK. It is proposed, on page 2, line 23, to change the period to a colon and add the following:

Provided, That a State may designate both a college (or university) established in accordance with said Act approved July 2, 1862 (12 Stat. 503) and one or more other institutions of higher education for this purpose.

Mr. MILLER. Mr. President, this amendment is designed to make absolutely clear what the proponents of the bill intend. The way the bill reads now, it seems it could possibly be interpreted that a land-grant college could receive the program, or, if a land-grant college was not designated by a State, then one or more institutions of higher learning within the State could be determined upon by the State.

It seems to me we ought to leave it up to the State legislature whether it wanted to have both a land-grant college and one or more universities or institutions of higher learning in the State so designated. This amendment provides that a State will have that power.

Mr. ANDERSON. Mr. President, will the Senator yield?

Mr. MILLER. I yield.

Mr. ANDERSON. Will the Senator specify an instance of what he is referring to? Is there an institution in his State involved?

Mr. MILLER. This matter came to my attention as a result of information from one of the presidents of one of the institutions of higher learning in Iowa. In Iowa we happen to have a land-grant college which is no longer a college. It is now designated a State university. We also have the State University of Iowa. I would like to have the bill provide that discretion is given the State of Iowa as to whether it may wish to have this program carried on both at Iowa State at Ames and at the State University of Iowa at Iowa City.

I can see where other States might have a similar problem.

As I interpret the bill as it is now written, if it should be determined by the State that it should be Iowa State at Ames that will handle the program, then it cannot go into another institution of higher learning within the State.

The amendment will give the State that choice. I am quite sure the Senator from New Mexico would like a State to have that choice.

Mr. ANDERSON. We think the language of the bill is abundantly clear. But we want the Senator from Iowa to be satisfied. I know of the situation in Iowa, having been a neighbor to that State for many years. I do not believe the amendment changes the intent of the bill.

Therefore, I am prepared to accept the amendment, and do so.

I yield back the remainder of my time.

Mr. MILLER. I yield back the remainder of my time.

The PRESIDING OFFICER. All remaining time for debate has been yielded back. The question is on agreeing to the amendment.

The amendment was agreed to.

Mr. JOHNSTON. Mr. President, I call up amendment No. 55 which is offered by the distinguished Senator from Texas [Mr. YARBOROUGH] and myself.

The PRESIDING OFFICER. The amendment will be stated.

The LEGISLATIVE CLERK. Beginning on page 5, strike all of section 103 and substitute in lieu thereof:

SEC. 103. (a) Paragraph (1) of section 4152(a) of title 39, United States Code, is amended by striking the word "and" at the end of subparagraph (E) and by adding the following at the end of subparagraph (F): "and

"(G) Any institute or center engaged in activities authorized by the Water Resources Research Act consisting of bulletins, reports, periodicals, reprints of articles, and other publications necessary for the dissemination or results of researches and experiments within the scope of the Act, as determined by the Secretary of the Interior, mailed from the principal place of business of the institute or center, or from an established subunit of the same."

(b) Section 4156 of title 39, United States Code, is amended by adding a new subsection (d) as follows:

"(d) The Department of Interior shall transfer to the Post Office Department as postal revenue out of any appropriation made to it for that purpose the equivalent amount of postage, as determined by the Postmaster General, for penalty mailings under section 4152(a) (1) (G) of this title."

Mr. JOHNSTON. The only purpose of the amendment is to provide that the Postmaster General shall determine the amount of postage for penalty mail used under the terms of the bill, in the same way in which he now determines such postage. The bill provides a new item, and there is a possibility that the refund to the Post Office Department for penalty mail will not be included under the language of the bill as it now reads.

Mr. ANDERSON. Mr. President, will the Senator yield?

Mr. JOHNSTON. I yield.

Mr. ANDERSON. I understand that this involves merely a bookkeeping transaction, in reality. Is that correct?

Mr. JOHNSTON. A bookkeeping matter between the two Departments. Penalty mail is involved already, but we feel that under the language of the bill the new penalty mail might not be considered in determining the total amount of penalty mail.

Mr. ANDERSON. For the sake of legislative history I ask the distinguished chairman of the Committee on Post Office and Civil Service if it is true that this does not involve the operation of the colleges themselves, or where the money is to go, or anything of that nature.

Mr. JOHNSTON. The Senator is correct.

Mr. ANDERSON. It involves only penalty mail. Is that correct?

Mr. JOHNSTON. It involves only the penalty mail that would be included in the grand total. The Postmaster General would make up the estimates.

Mr. ANDERSON. I have no objection to the amendment. I accept it. I yield back the remainder of my time.

Mr. JOHNSTON. I yield back the remainder of my time.

The PRESIDING OFFICER. All remaining time has been yielded back. The question is on agreeing to the amendment.

The amendment was agreed to.

Mr. LONG of Louisiana. Mr. President, I call up my amendment identified as No. 56.

The PRESIDING OFFICER. The amendment will be stated.

The LEGISLATIVE CLERK. On page 11, between lines 2 and 3, insert the following new section:

SEC. 305. No part of any appropriated funds may be expended pursuant to authorization given by this Act for any scientific or technological research or development activity unless such expenditure is conditioned upon provisions determined by the Secretary of the Interior, with the approval of the Attorney General, to be effective to insure that all information, uses, products, processes, patents, and other developments resulting from that activity will (with such exceptions and limitations as the Secretary may determine after consultation with the Secretary of Defense to be necessary in the interest of the national defense) be made freely and fully available to the general public. Nothing contained in this subsection shall deprive the owner of any background patent relating to any such activity of any right which that owner may have under that patent.

On page 11, line 3, strike out "Sec. 305", and insert in lieu thereof "Sec. 306".

On page 11, line 14, strike out "Sec. 306", and insert in lieu thereof "Sec. 307".

Mr. LONG of Louisiana. The amendment seeks to assure that the result of the research done under the program authorized in the pending bill would be made available in general to industry, States, cities, and other communities throughout the entire country, by assuring that the Government would retain patent rights to the inventions that would result from research performed with Government money.

The present policy in the Department of the Interior, we are assured, is to that effect. We have been told that the same result would come under the present policy of the Department as would be assured by the adoption of the amendment. However, we do not know what could happen under a future Secretary of the Interior, or whether at some future time pressure would not be brought to bear upon the administration to permit private patents to exist from developments in this field.

The amendment provides that the Department could not yield to such pressures.

The amendment is identical to the amendment which was added to the

saline water research bill, which was introduced by the Senator from New Mexico, the distinguished chairman of the Committee on Interior and Insular Affairs. That amendment carried out the same purposes with respect to saline water research. We do not want a private contractor to obtain a patent as a result of research being done with Government money, and thus deny cities, States, and other communities of something that has been developed with such Government money.

I know that the chairman of the committee is sympathetic to this amendment, having added such an amendment to the saline water research bill. He also had something to do with the Helium Gas Act, now the law, and which also contains such a provision. He also approved of it when it was made a part of the Coal Research Development Act.

The amendment I am offering seeks to carry out the policy that was approved by Congress on several occasions. We want to make sure that the public gets the benefit from any inventions that might result, and that no private patents will be obtained as a result of Government research.

Mr. MORSE. Mr. President, will the Senator yield?

Mr. LONG of Louisiana. I yield.

Mr. MORSE. As a cosponsor of the bill, I agree with everything the Senator from Louisiana has said. I hope the chairman will see fit to take the amendment to conference.

Mr. ANDERSON. Mr. President, will the Senator yield?

Mr. LONG of Louisiana. I yield.

Mr. ANDERSON. I know what the Senator from Louisiana has been trying to do for a long time in this field. I see absolutely nothing wrong with the amendment. As the Senator from Oregon has suggested, I will take the amendment to conference. I accept the amendment. I yield back the remainder of my time.

Mr. LONG of Louisiana. I merely wish to point out that on page 19 of the committee report the Secretary of the Interior states that he feels the amendment would be appropriate on the bill. I yield back the remainder of my time.

The PRESIDING OFFICER. All time has been yielded back. The question is on agreeing to the amendment.

The amendment was agreed to.

The PRESIDING OFFICER. If there be no further amendment to be offered, the question is on the engrossment and third reading of the bill.

Mr. ALLOTT. Mr. President—

Mr. ANDERSON. I know that the Senator from Colorado has another amendment to offer. We have discussed it.

Mr. ALLOTT. There is so much noise in the Chamber I cannot hear what is being said. I send an amendment to the desk and ask for its immediate consideration.

The PRESIDING OFFICER. The amendment will be stated.

The LEGISLATIVE CLERK. On page 10, line 22, it is proposed to insert after the word "Act" the words "with an educa-

tional institution or nonprofit organization." On page 11, line 1, it is proposed to strike out the words "such payments" and to insert in lieu thereof the words "advance payments of initial expense."

Mr. ALLOTT. Mr. President, this is a very simple amendment. The purpose of the amendment is to enable initial payments to be made to educational institutions and nonprofit organizations when they are unable to do so.

The real reason for the proposed change is that the language in the bill is not satisfactory. The amendment will make it conform to the principles which we worked out under S. 20 since the first of the year. I have discussed the amendment with the author of the bill. I believe it is entirely satisfactory to him.

Mr. ANDERSON. Mr. President, will the Senator yield?

Mr. ALLOTT. I yield.

Mr. ANDERSON. I wish to say that the Senator from Colorado did help us materially with S. 20. This is an attempt to follow the same principle in the pending bill. I commend him for his efforts. As far as I am concerned, I will accept the amendment.

Mr. ALLOTT. I should like to add that this is not the exact language, but it follows the same principle.

Mr. ANDERSON. Yes. I subscribe to what the Senator has said. It is not the exact language. I did not mean to say it was. The Senator from Colorado was helpful in connection with S. 20 in working out the language. The language he suggests now will accomplish the same purpose under the same principle. I am glad to accept the amendment.

I yield back the remainder of my time.

Mr. ALLOTT. I yield back the remainder of my time.

The PRESIDING OFFICER. All remaining time has been yielded back. The question is on agreeing to the amendment.

The amendment was agreed to.

Mr. ALLOTT. Mr. President, I yield 2 minutes to the senior Senator from South Dakota.

Mr. MUNDT. Mr. President, the Water Resources Research Act at maturity would make available \$100,000 each year to every State for water research; would make an additional \$5 million available each year to these research centers on a matching basis, dollar for dollar, for money supplied by the States or by other non-Federal sources; and would make another \$10 million available annually to be directed by the Secretary of Interior through arrangement with the States or other qualified organizations for needed water research not otherwise being studied.

The Great Plains and the West have been aware since settlement of the significance of water. Development there has been guided by and has been limited to the availability of water.

These limitations on development potential become more discernible every year, and further development is feasible largely to the extent that water is available and to the extent that available water is more prudently used.

And now in recent years responsible studies are giving notice that the eastern

half of the country will be facing the same problems before the expiration of the 20th century. Until recently the East has considered itself secure against problems of water scarcity.

So obviously it is time for a national implementation of a purposeful, expansive, coordinated, and determined continentwide scientific pursuit for better methods of water acquisition and utilization. The Water Resources Research Act would begin such a pursuit. I support it enthusiastically.

The program adopts the same kind of decentralized and diversified effort that the United States has used for 75 years in striving toward better and more productive agricultural methods. And this approach is very likely the most promising one we could take toward reducing the water problem.

One essential reason for the success of agricultural research and for the success in our having its findings adopted in translating good research into better farming practices has been its widely decentralized attack. Federally encouraged agricultural research has been done by each State, each one directing its own efforts at problems peculiar to its own area, which has resulted in a solid betterment of agricultural practices in every segment of agriculture.

The effort to utilize this same system for water research is well grounded. There is no one single problem in water research. Nor is there merely a half-dozen or so problems that could be farmed out to a half dozen high prestige university research centers for investigation.

We are here approaching a many-faceted problem far more fundamentally in establishing a procedure whereby the States are free to adapt the water research program however it best fits their needs.

And in their doing this, each State will be able to develop a substantial number of cooperating water experts whose availability to the States will continue. The States will not be dependent on a body of expert knowledge developed at Federal expense but available to the States only at high cost from a center of learning perhaps half a continent away.

Passage of this bill will position us from the beginning to meet a continental water shortage squarely, looking for solutions to as many facets of the problem as there are facets which demand attention.

I think it is appropriate, too, in discussing this most promising piece of legislation, to recall the work of my late colleague from South Dakota, Francis Case, during his 25 years in Congress.

Water was his basic campaign concern in 1934, when he was defeated, and again in 1936, when he was first elected to Congress, and from then until his death. He worked continuously on water legislation during his generation in Congress. Much of the existing water legislation has the imprint of his work, right up to the recent saline water programs and the futuristic interest in weather modification.

Throughout those more than two dec-

ades of effort on the problems of water conservation and utilization it was my privilege and purpose to work closely with former Senator Case in promoting and developing these programs. In the House, when we served together there he was on the Appropriations Committee and I was on a legislative committee enabling us to operate a "one-two punch" in support of constructive water projects. We worked together for example on the first effective water pollution control bill to pass the House in the form of a measure which I authored. We advanced so-called Wheeler-Case water projects. We cooperated on other water development programs including the Pick-Sloan plan and many Missouri River development projects including both those on the main stem and dozens of water-conservation area and local projects. In the Senate, in turn, I served on the Appropriations Committee and Francis Case served on a legislative committee again enabling us to work jointly in authorizing programs and projects and in securing the needed money to implement them.

With the death of Francis Case last year I picked up where he left off promoting unfinished projects which he had started and initiating and supporting others in this wide area of constructive activity. I shall continue to concentrate my time and effort in this important area of public service.

As much as with the work of any person, enactment of this bill will be the logical outgrowth and natural extension of Francis Case's efforts for adequate water.

Mr. ANDERSON. Mr. President, I yield 2 minutes to the senior Senator from Alaska.

WATER RESOURCE DEVELOPMENT VITAL TO ALASKA'S FUTURE

Mr. BARTLETT. Mr. President, I am pleased that the Senate is today taking final action on S. 2, a bill to establish water resource research centers in the several States in cooperation with State and educational authorities.

This bill is a beginning step in the development of a more adequate national program for water research and water resource conservation.

As such, it is badly needed.

The bill before us today is a modest measure designed to meet what will become one of the major problems to face our Nation in this century. Our rapidly growing population and our vast industrial complex are making heavier and ever heavier demands on our Nation's water supply. It has been estimated that by 1980 the south Pacific, the Colorado River Basin, the Great Basin, the Upper Rio Grande-Pecos, and the Upper Missouri River Basins will be unable to fulfill the water demands placed upon them. Our Nation needs new sources of water and comprehensive plans on how to use them.

This bill, S. 2, is not intended in itself to offer solutions to our water shortage problems. It is intended to provide the skilled scientific personnel and the laboratory facilities and techniques which will be needed if the solution is to be found.

My own State of Alaska has great need for such research facilities as are envisioned by S. 2. Alaska's water problems are not of scarcity, they are of utilization. We have in our State vast resources of water which are unused and wasted. Millions of kilowatts of power run unused into the sea. As, in the coming years, Alaska's economy expands and develops the State will have need of this power and of this precious resource.

This bill will assist the State to plan the development of a research center in conjunction with the State university. Such a center will be able, in a coherent and ordered manner, to map the development of Alaska's water resources.

I am pleased, Mr. President, to be a cosponsor of this measure. I urge its early and wholehearted adoption by the Senate.

I ask unanimous consent that a letter which I addressed to the chairman of the Senate Interior Committee and enclosures will be made a part of the RECORD at this point.

There being no objection, the letter and enclosures were ordered to be printed in the RECORD, as follows:

FEBRUARY 20, 1963.

HON. CLINTON P. ANDERSON,
Chairman, Senate Interior and Insular Affairs Committee.

DEAR MR. CHAIRMAN: I am pleased to be a cosponsor of S. 2, a bill to assist the establishment of water resource research centers at State universities; to promote a more adequate national program of water research; and to provide for the training of research personnel.

This bill is important to my State of Alaska and to all the States. I congratulate you and your committee, Mr. Chairman, for giving this measure the priority consideration it so clearly deserves.

The bill before the committee is a modest proposal concerning a major problem. The problem, of course, is how efficiently to utilize our water resources and how best to provide for their proper conservation. The proposal is not a solution to this problem—nor is it intended to be. When solutions are found, however, they will be found by personnel trained under the provision of S. 2, utilizing techniques and equipment developed in S. 2 laboratories.

The research centers which this bill provides for are modeled after the wholly successful program of State agriculture extension services. Funds—not more than \$100,000 per year—would be provided to the several States for use in the establishment of a State water center. This bill also provides for specific grants in aid for particular research projects. It is the hope of the sponsors of this legislation that it will encourage and develop the training of scientists and personnel equipped to work in the area of water research.

I am hopeful, Mr. Chairman, that the committee will make very clear that S. 2 will not conflict with—but will rather complement—research programs already undertaken by the Federal Government in water use and conservation. It should also be made clear that it does not interfere with studies now underway, with Federal, State and local participation, into the economic needs and development of river basins.

For example, under the terms of the Federal Water Pollution Control Act, seven water pollution laboratories are to be constructed at sites across the country. Alaska is fortunate to have been selected as one of the sites and the fiscal 1964 budget now before

the Congress includes funds for the construction of this laboratory. It is clear, I believe, that should the University of Alaska undertake to set up a water resource research center using S. 2 funds there would be ample opportunity for coordination and cooperation between the two facilities.

The Alaska congressional delegation has been working closely with the executive branch in an effort to establish a joint Federal-State Planning Commission to attempt a coherent projection of the economic development of Alaskan resources. Such a study would, of course, include water use and would have ample reason to work closely with, and to profit from, a State water research center.

The University of Alaska is greatly interested in S. 2. Enclosed you will find expression of this interest, a letter from the president of the university, William R. Wood. I would appreciate your making it a part of the committee record on the bill.

Sincerely yours,

E. L. BARTLETT.

FEBRUARY 12, 1963.

HON. E. L. BARTLETT,
*Senate Office Building,
Washington, D.C.*

DEAR SENATOR BARTLETT: I have read with much interest the copy of S. 2, "a bill to establish water resources research centers at land-grant colleges and State universities," which as a cosponsor you sent to my office. The bill has been reviewed in detail by a number of our faculty, including Dr. Kenneth Rae, director of the Institute of Marine Science, Dean Earl Beistline, of the College of Earth Science and Mineral Industry, and Dr. C. T. Elvey, vice president for research and advanced study. All of us are keenly interested in the intent of S. 2 and are in strong support of its several provisions. We believe that a program such as the one proposed would compliment the work that is in prospect in water pollution studies by the U.S. Public Health Service, and could become an important part of the total Arctic research program which we are attempting to develop.

I am enclosing a copy of a letter from Dr. Elvey to Senator ANDERSON concerning the interest of the University of Alaska in water resources research. These, I am certain, you will find of interest.

Sincerely yours,

WILLIAM R. WOOD,
President.

JULY 5, 1962.

HON. CLIFTON P. ANDERSON,
U.S. Senate, Washington, D.C.

DEAR SENATOR ANDERSON: With reference to your letter of May 31, 1962, requesting information on water research, we have only a few projects supported by various governmental agencies which have a bearing on the subject.

One project entitled "Glaciological Investigations in Central Alaska" is partially supported by a grant from the National Science Foundation. As you know, a glacier is an index of climatic conditions: hence, understanding of the glaciers gives us a long history of climatic conditions. Another line of attack on past precipitation is furnished by studies of the snow and ice fields at the heads of glaciers. We have one project supported by the Cold Regions Research and Engineering Laboratory of the U.S. Army to study the snow field at the top of Mt. Wrangell, an approximate 14,000-foot elevation. Studies of the stratified layers in the snow fields give important data on the amount of precipitation.

In certain regions of Alaska water precipitation is small and mostly in the form of snow. It is very difficult to measure the

amount owing to the shifting of the snow by the winds. Studies of snow fields will provide the only method of measuring the amount of precipitation on the north coastal slope of Alaska as well as certain areas in the interior. In connection with this work, we have a grant supported by the National Science Foundation entitled "A Reconnaissance Snow Survey on the Arctic Coast of Alaska." A similar project surveying the snow of the Yukon Valley will be supported by the Cold Regions Research and Engineering Laboratory of the U.S. Army.

The projects we have underway, as listed above, are only scratching the surface as far as research pertaining to water resources in Alaska.

The problem of water resources in Alaska varies greatly across the State. On the Arctic slope north of the Brooks Range there is permafrost which extends to a depth of 1,000 feet. This produces a serious limitation on the supply of water and upon the disposition of sewage and other waste products. In the interior of Alaska the permafrost is intermittent and often the underground water is associated with boggy areas, therefore of poor quality. The winter frosts reach to a depth of 7 feet, consequently upsetting water supplies during the winter months. In the southern parts of the State where the annual precipitation is high we have extensive glaciers. Streams which originate with glaciers are "milky" with finely ground rock.

I hope this gives you a feel for the problems in connection with water research in Alaska. If I can be of any further service to you please call upon me.

Sincerely yours,

C. T. ELVEY,
*Vice President for Research
and Advanced Study.*

Mr. ANDERSON. Mr. President, I yield 2 minutes to the junior Senator from South Dakota.

LET'S TAKE ACTION TO PREVENT WATER
SHORTAGE

Mr. McGOVERN. Mr. President, I believe that Senate bill 2, the Water Resources Research Act, of which I am a cosponsor, is one of the most important measures before the 88th Congress. All human activity is affected by the availability of pure water. We must know more about the conservation, development, and utilization of water resources. We have a great deal to learn, and S. 2 will enable us to speed up the acquisition of knowledge by complementing and coordinating Federal, State, and private research now in progress.

Under title I of the bill, funds would be authorized for distribution by the Secretary of the Interior to land-grant or other State-designated institutions for the purpose of establishing water resources research institutes. Additional funds would also be authorized which the Secretary could use to match funds made available to the institutes by the States or by other sources.

Title II of the bill would authorize additional appropriations to the Secretary from which he could make grants, contracts, or other arrangements with Government or private agencies and institutions.

Title III contains certain miscellaneous provisions related to the administration of programs under the bill, including authority for the Secretary to establish in the Department a Water Resources Research Service.

According to the study made by the President's Special Task Force on Water Research, vast areas of the Nation face serious and even critical water shortages. In the Southwest underground water is being mined at an alarming rate, and new sources must soon be found to supply even the present population. In several humid areas the amount of water needed to dilute sewage approaches, and in some places already exceeds, the amount of water in the rivers during times of low flow." By the year 2000 the use of water probably will exceed supplies in the Upper Missouri, Rio Grande-Pecos, Colorado, Great Basin and southern California regions and may exceed supplies in the western gulf areas.

According to the report, the increasing demand for water can be met by increasing the efficiency of water use. The report goes on to point out that in many parts of the Nation new and undeveloped sources of surface water are extremely limited. Some areas may have to reduce their rates of industrial and population growth or shift to crops demanding less water if something is not done. Much research needs to be undertaken in the conversion to human use of presently unusable water supplies, including salt water. The report also urged that every effort be made to use and conserve the existing local water supplies.

In South Dakota we are well aware of the need for research in water resources. Water has long been the economic lifeblood of our State. The northern plains have traditionally been a water-shortage area, limiting the economic growth of the region and the opportunities for young people. All of our State is within the area designated by the President's Committee as facing a serious water shortage by the year 2000.

In a recent letter Dean Orville G. Bentley of the Division of Agriculture of South Dakota State College made an incisive analysis of the reasons why South Dakotans are interested in this legislation. He wrote:

Our problems are characteristic of those indigenous to the Great Plains area and include the variability of rainfall as it threatens the economic stability of the region's major industry—agriculture. Besides an inadequate supply of water, the quality of water available to municipalities is poor and frequently hampers urban and industrial growth. Fluctuating water supplies interfere with the State's future development of recreational areas and profitability of converting land from agriculture to other uses such as recreation. We look at water resource development as one of the tools for increasing the employment opportunities for young people within the State. For these reasons South Dakota State College has committed resources to research, teaching, and extension programs that are related to water resource development. We are limited in funds and personnel but, given additional support, we could expand our research into such areas as evaporation reduction, desalinization of water, the development of small-scale water treatment facilities, and expanding studies on the improved utilization of water in agriculture.

Mr. President, the bill before us today calls for a comparatively modest expenditure, but it can make a very large

contribution to the life and progress of our Nation. Currently, we are using more than 300 billion gallons of water daily and this amount will double in the next 20 years. Scarcely any measure in the 88th Congress will have a bearing on so many facets of the lives of our citizens as S. 2. Continued progress in industry, agriculture, recreation, and public health, to mention only a few areas of our national life, is dependent on a continuous and expanding supply of good water.

The passage of this bill, like the TVA 30 years ago, will be, in the words of George Norris, "emblematic of the dawn of that day when every rippling stream that flows down the mountainside and winds its way through meadows to the sea, should be harnessed and used and made to work for the welfare and comfort of man."

The PRESIDING OFFICER. The bill is open to further amendment. If there be no further amendment to be offered, the question is on the engrossment and third reading of the bill.

The bill was ordered to be engrossed and to be read a third time.

The bill was read the third time.

The PRESIDING OFFICER. Do Senators wish to yield any of their time, or do they desire to yield back the remainder of their time on the bill.

Mr. ANDERSON. I yield back the remainder of my time on the bill.

Mr. ALLOTT. I yield back the remainder of my time.

The PRESIDING OFFICER. All remaining time has been yielded back. The question now is, Shall the bill pass? The bill (S. 2) was passed.

Mr. LAUSCHE subsequently said: Mr. President, a short time ago the Senate took a voice vote on the question of the passage of the water resources bill. I disapprove of the bill. For years, Ohio has been doing the work which is contemplated in connection with the bill. I cannot believe that the States are financially incapable of doing the job envisioned by those who support the provisions of the bill which the Senate passed this afternoon. Moreover, I believe this bill is but the forerunner of huge expenditures by which the Federal Government will, after the studies are made, finance projects which should be financed at home.

Hence, Mr. President, I desire to state that if a yea-and-nay vote had been taken on the question of the passage of the bill, I would have voted against it.

DEATH OF IZHAK BEN-ZVI, PRESIDENT OF ISRAEL

Mr. JAVITS. Mr. President, I wish to call the attention of the Senate to the death of the President of Israel, Izhak Ben-Zvi, at the age of 78. Mr. Ben-Zvi had been President of Israel since 1952. He was a great friend of the United States.

I had the privilege to know him and, together with my wife and children, to visit with him in his official residence.

Mr. Ben-Zvi was a great hero in the establishment of the State of Israel. He

helped to organize the Jewish Legion, and returned to Palestine with the conquering army of British General Allenby. He was a great force, even at that time, in laying the basis for an independent state.

Mr. Ben-Zvi was a distinguished scholar and writer. He was the closest friend of Prime Minister Ben-Gurion, throughout his active days in the work for the establishment of Israel and took part, in the formation of the country's leading institutions, the Histadrut, the country's labor federation; and the Hashomer, the forerunner of the Haganah defense organization, which ultimately brought about Israel's independence.

Mr. Ben-Zvi was in the great tradition of Dr. Chaim Weizmann, the first President of Israel. He had numerous friends among members of this body and of the other body, many of whom visited with him personally. I know that we all mourn with Israel the loss of this eminent statesman and scholar. I feel certain that the next President of Israel will be worthy of the example set by this distinguished man.

Mr. KEATING. Mr. President, I wish to express my deep regret over the loss suffered by our Nation and by the entire world in the death of President Izhak Ben-Zvi, of Israel. His career as the head of this friendly and courageous nation—Israel—has been a great asset to the free world, as well as to Israel; and I join with the people of Israel in mourning his death.

President Ben-Zvi will long be remembered for his leadership in behalf of his people. Renowned for his scholarship and writing, he took a leading role in the formation of the Histadrut, Israel's labor federation, and the Hashomer, the forerunner of the Haganah defense organization which battled for Israel's independence.

A distinguished successor to Dr. Chaim Weizmann, Israel's first President, President Ben-Zvi will long be remembered—along with his close friend and ally in forging freedom for the people of Israel, Prime Minister David Ben Gurion—as one of the principal architects in creating the Jewish State.

As a great admirer and friend of the people of Israel in their struggle for national recognition, I join in the great sorrow the whole world feels in being deprived of the services of this great humanitarian and distinguished statesman.

UNITY IN THE TRANSPORTATION INDUSTRIES

Mr. SMATHERS. Mr. President, one of the outstanding personalities in the field of transportation in the United States is Morris Forgash, a distinguished citizen of New York. Mr. Forgash is president of the U.S. Freight Co.

Yesterday the New York World Telegram and Sun published an article about Mr. Forgash entitled "U.S. Freight Head Champions Unity," written by Mary C. Stokes. I ask unanimous consent that the article be printed at this point in the Record.

88TH CONGRESS
1ST SESSION

S. 2

IN THE HOUSE OF REPRESENTATIVES

APRIL 24, 1963

Referred to the Committee on Interior and Insular Affairs

AN ACT

To establish water resources research centers at land-grant colleges and State universities, to stimulate water research at other colleges, universities, and centers of competence, and to promote a more adequate national program of water research.

1 *Be it enacted by the Senate and House of Representa-*
2 *tives of the United States of America in Congress assembled,*
3 That it is the policy and purpose of the Congress to assure
4 the Nation at all times an abundance of water, both as to
5 quantities and quality, necessary to meet the requirements
6 of its expanding population, and, to help achieve this objec-
7 tive, to stimulate, sponsor, and provide for the conduct of
8 research, investigations, and experiments in the field of water

1 and related resources as they affect water, supplementing
2 present programs, and to encourage the training of scientists
3 in fields related to water by assistance to colleges and univer-
4 sities in the development of water resources research
5 programs.

6 TITLE I—STATE WATER RESOURCES RESEARCH
7 INSTITUTES OR CENTERS

8 SEC. 100. (a) There is authorized to be appropriated,
9 for the fiscal year 1964 and subsequent years, for distribu-
10 tion to a college or university in each State and Puerto Rico,
11 established in accordance with an Act approved July 2,
12 1862 (12 Stat. 503), entitled "An Act donating public
13 lands to the several States and territories which may provide
14 colleges for the benefit of agriculture and the mechanic arts",
15 or such other institutions of higher education as any State
16 shall determine, a sum adequate to provide \$75,000 to each
17 State in the first year, to be increased by \$12,500 each
18 succeeding fiscal year for two years and to continue at
19 \$100,000 thereafter, for the purpose of establishing a college-
20 wide or universitywide water resources research institute,
21 center, or equivalent agency: *Provided*, That a State may
22 designate both a college (or university) established in ac-
23 cordance with said Act approved July 2, 1862 (12 Stat.
24 503), and one or more other institutions of higher education
25 for this purpose. It shall be the duty of each such institute

1 or center to plan and conduct and/or arrange for a compo-
2 nent or components of its college or university to conduct
3 competent researches, investigations, or experiments, of either
4 a basic or practical nature, or both, in relation to water
5 resources, including but not limited to aspects of the hydro-
6 logical cycle, supply and demand for water, conservation and
7 best use of available supplies, methods of increasing such
8 supplies, economic, legal, social, engineering, recreation, bio-
9 logical, geographic, ecological, and other aspects of water
10 problems, as may in each case be deemed advisable, having
11 due regard to the varying conditions and needs of the re-
12 spective States and Puerto Rico, to water research projects
13 being conducted by agencies of the Federal Government,
14 and to those related to agriculture being conducted by the
15 agricultural experiment stations, and also having regard to
16 avoidance of any undue displacement of scientists and engi-
17 neers elsewhere engaged in water resources research.

18 (b) There is further authorized to be appropriated to
19 the Secretary of the Interior in the fiscal year 1964 the sum
20 of \$1,000,000, increasing by \$1,000,000 each year for four
21 years to \$5,000,000 in fiscal year 1968 and thereafter, which
22 the Secretary of the Interior may use to match, on a dollar
23 for dollar basis, funds made available to State water re-
24 sources research institutes or centers by the States or other
25 non-Federal sources, to meet the necessary expenses of water

1 resources research projects which could not otherwise be
2 undertaken, including the expense of planning and coordinat-
3 ing regional water resources research projects by two or
4 more State water research agencies.

5 SEC. 101. Sums available to the States under the terms
6 of section 100 (a) of this Act shall be paid to the designated
7 institution or institutions in each State in equal quarterly
8 payments beginning on the first day of July of each fiscal
9 year upon vouchers approved by the Secretary of the
10 Interior. Each such agency authorized to receive funds
11 shall have an officer appointed by its governing authority
12 who shall receive and account for all funds paid to the State
13 under the provisions of this Act and shall make an annual
14 report to the Secretary of the Interior, on or before the first
15 day of September of each year, on work accomplished and
16 the status of projects underway together with a detailed
17 statement of the amount received under any of the provisions
18 of this Act during the preceding fiscal year, and of its dis-
19 bursement, on schedules prescribed by the Secretary of the
20 Interior. If any of the moneys received by the authorized
21 receiving officer of any State water resources research agency
22 under the provisions of this Act shall by any action or con-
23 tingency be found by the Secretary of the Interior to have
24 been improperly diminished, lost, or misapplied, it shall be
25 replaced by the State concerned and until so replaced no

1 subsequent appropriation shall be allotted or paid to such
2 States. Pending a meeting of the legislature of any State,
3 the Secretary of the Interior shall pay sums appropriated
4 pursuant to section 100 of this Act to a qualified institution
5 designated by the Governor of such State.

6 SEC. 102. Moneys appropriated pursuant to this Act
7 shall also be available, in addition to meeting expenses for
8 research and investigations conducted under authority of this
9 Act, for printing and disseminating the results of such re-
10 search, retirement of employees subject to the applicable pro-
11 visions of the Act approved March 4, 1940 (54 Stat. 39),
12 administrative planning and direction, and for the purchase
13 and rental of land and the construction, acquisition, altera-
14 tion, or repair of buildings necessary for conducting research.
15 The State water resources research agencies are authorized
16 to plan and conduct any research authorized under this Act
17 in cooperation with each other and such other agencies and
18 individuals as may contribute to the solution of the water
19 problems involved, and moneys appropriated pursuant to this
20 Act shall be available for paying the necessary expenses of
21 planning, coordinating, and conducting such cooperative re-
22 search. Two or more States may cooperate in the designa-
23 tion of a single interstate or regional research institute or
24 center.

25 SEC. 103. (a) Paragraph (1) of section 4152 (a) of

1 title 39, United States Code, is amended by striking the
2 word “and” at the end of subparagraph (E) and by adding
3 the following at the end of subparagraph (F) : “and

4 “(G) Any institute or center engaged in activities au-
5 thorized by the Water Resources Research Act consisting of
6 bulletins, reports, periodicals, reprints of articles, and other
7 publications necessary for the dissemination or results of re-
8 searches and experiments within the scope of the Act, as
9 determined by the Secretary of the Interior, mailed from the
10 principal place of business of the institute or center, or from
11 an established subunit of the same.”

12 (b) Section 4156 of title 39, United States Code, is
13 amended by adding a new subsection (d) as follows:

14 “(d) The Department of Interior shall transfer to the
15 Post Office Department as postal revenue out of any appro-
16 priation made to it for that purpose the equivalent amount of
17 postage, as determined by the Postmaster General, for
18 penalty mailings under section 4152 (a) (1) (G) of this
19 title.”

20 SEC. 104. The Secretary of the Interior is hereby
21 charged with the responsibility for the proper administra-
22 tion of this Act, and, after full consultation with other Fed-
23 eral agencies, is authorized and directed to prescribe such
24 rules and regulations as may be necessary to carry out its
25 provisions, including requirement of a showing that agencies

1 designated to receive funds have, or may reasonably be
2 expected to have, the capability of doing effective work. It
3 shall be the duty of the Secretary to furnish such advice and
4 assistance as will best promote the purposes of this Act,
5 including participation in coordination of research initiated
6 under this Act by the State water resources research agen-
7 cies, from time to time, to indicate such lines of inquiry as
8 to him seem most important, and to encourage and assist
9 in the establishment and maintenance of cooperation by and
10 between the several State water resources research agencies
11 and between the State agencies and the United States
12 Department of the Interior and other Federal establishments.

13 On or before the 1st day of July in each year after the
14 passage of this Act, the Secretary of the Interior shall ascer-
15 tain whether the requirements of section 101 have been
16 met as to each State whether it is entitled to receive its share
17 of the annual appropriations for water resources research
18 under section 100 (a) of this Act and the amount which
19 thereupon each is entitled, respectively, to receive.

20 The Secretary of the Interior shall make an annual
21 report to the Congress of the receipts and expenditures and
22 work of the water resources research agencies in all States
23 under the provisions of this Act and also whether any portion
24 of the appropriation available for allotment to any State has
25 been withheld and if so the reasons therefor.

1 SEC. 105. Nothing in this Act shall be construed to im-
2 pair or modify the legal relation existing between any of
3 the colleges or universities under whose direction State water
4 resources research institutes or centers are established and
5 the government of the States in which they are respectively
6 located: *Provided*, That in any State which designates more
7 than one such college or university to have a water resources
8 research center the appropriations made pursuant to section
9 100 (a) of this Act for such State shall be divided between
10 such institutions as the legislature of such State shall direct:
11 *Provided further*, That in any instance where two or more
12 States designate a single interstate or regional institute or
13 center, the funds of each of the States under section 100 (a)
14 may, upon the direction of the States, be paid to the desig-
15 nated agency.

16 TITLE II—ADDITIONAL WATER RESOURCES
17 RESEARCH PROGRAMS

18 SEC. 200. There is authorized to be appropriated to the
19 Secretary of the Interior \$5,000,000 in fiscal year 1964,
20 increasing \$1,000,000, annually for five years, and continu-
21 ing at \$10,000,000 annually thereafter from which he may
22 make grants, contracts, matching, or other arrangements
23 with educational institutions, private foundations, or other
24 institutions; with private firms and individuals; and with
25 local, State, or Federal Government agencies, to undertake

1 research into any aspects of water problems related to the
2 mission of the Department of the Interior, which may be
3 deemed desirable and are not otherwise being studied.

4 TITLE III—MISCELLANEOUS PROVISIONS

5 SEC. 300. The Secretary of the Interior shall arrange
6 for the regular advice and cooperation of all agencies of the
7 Federal Government concerned with water problems, of State
8 and local governments and of private institutions and
9 individuals, to assure that the programs authorized in this
10 Act will supplement and not duplicate established water
11 research programs, to stimulate research in otherwise ne-
12 glected areas, and to contribute to a comprehensive, nation-
13 wide program of water and related resources research. He
14 shall make generally available information and reports on
15 projects completed, in progress, or planned under the
16 provisions of this Act, in addition to any direct dissemination
17 of information by the research agencies themselves. Each
18 Federal agency doing water resources research or inves-
19 tigation shall advise the Secretary of the Interior at least
20 once annually of work underway or scheduled by it. The
21 Secretary of the Interior shall classify and maintain for
22 general use a catalog of water resources research and in-
23 vestigation projects in progress or scheduled by Federal
24 agencies, and by such non-Federal agencies of government,
25 colleges, universities, private institutions, firms and in-

1 individuals as may make voluntarily available information to
2 him: *Provided*, That upon the establishment of a central
3 or general system of cataloging current and projected scien-
4 tific research in all fields encompassing the cataloging func-
5 tion herein authorized, the President may transfer this
6 function as he determines to be desirable.

7 SEC. 301. Nothing in the foregoing section nor in this
8 Act is intended nor shall be construed as giving its Secretary
9 or the Department of the Interior any authority or surveil-
10 lance over water resources research conducted by any other
11 agency of the Federal Government, nor shall it be construed
12 as repealing, superseding, or diminishing existing authorities
13 or responsibilities of any agency of the Federal Government
14 to plan and conduct, contract for, or assist in research in its
15 areas of responsibility and concern with water resources.

16 SEC. 302. Contracts or other arrangements for water
17 resources research work authorized under this Act with an
18 educational institution or non-profit organization may be
19 undertaken without regard to the provisions of section 3684
20 of the Revised Statutes (31 U.S.C. 529) when in the
21 judgment of the Secretary of the Interior advance payments
22 of initial expense are necessary to facilitate such research.

1 SEC. 303. Within two years following enactment of this
2 Act, and annually thereafter, the Secretary of the Interior
3 shall prepare and submit to the President for transmittal to
4 the Senate and House of Representatives a comprehensive
5 report on progress and accomplishments under the Act, to-
6 gether with his recommendations on revisions of the Act, and
7 with the independent recommendations of the governing
8 authorities of the State colleges and universities on desirable
9 revisions.

10 SEC. 304. No part of any appropriated funds may be
11 expended pursuant to authorization given by this Act for
12 any scientific or technological research or development
13 activity unless such expenditure is conditioned upon pro-
14 visions determined by the Secretary of the Interior, with
15 the approval of the Attorney General, to be effective to
16 insure that all information, uses, products, processes, patents,
17 and other developments resulting from that activity will
18 (with such exceptions and limitations as the Secretary may
19 determine after consultation with the Secretary of Defense
20 to be necessary in the interest of the national defense) be
21 made freely and fully available to the general public.
22 Nothing contained in this subsection shall deprive the owner

1 of any background patent relating to any such activity of
2 any right which that owner may have under that patent.

3 SEC. 305. This Act may be known as the "Water Re-
4 sources Research Act."

Passed the Senate April 23, 1963.

Attest: FELTON M. JOHNSTON,
Secretary.

AN ACT

To establish water resources research centers at land-grant colleges and State universities, to stimulate water research at other colleges, universities, and centers of competence, and to promote a more adequate national program of water research.

APRIL 24, 1963

Referred to the Committee on Interior and Insular
Affairs

Dec 5, 1963

HOUSE

15. INDEPENDENT OFFICES APPROPRIATION BILL. Received the conference report on this bill. As reported the bill appropriates \$4,190,000 for civil defense and defense mobilization functions of Federal agencies as proposed by the Senate (House's figure, \$5,190,000); and provides that National Science Foundation appropriations may not be transferred to any other Government agency for research. (H. Rept. 1004). pp. 22388-92
16. AIR POLLUTION. Received the conference report on H. R. 6518, to improve, strengthen, and accelerate programs for the prevention and abatement of air pollution (H. Rept. 1003) pp. 22226-31
17. STANDARD CONTAINERS. The Science and Astronautics Committee reported without amendment H. R. 9334, relating to standards of containers for fruits and vegetables, to permit the use of additional standard containers (H. Rept. 999). p. 22392
18. WATER RESEARCH. The Irrigation and Reclamation Subcommittee of the Interior and Insular Affairs Committee voted to report to the full committee S. 2, to establish water resources research centers at land-grant colleges and State universities and promote a more adequate national program of water research. p. D961
19. FOREIGN AID. The "Daily Digest" states that the conferees agreed to file a report on H. R. 7885, the foreign aid authorization bill, and includes a table showing the amount requested by the administration, the amounts authorized by the House and Senate, and the final figures as agreed upon by the conferees. p. D962
20. RIVER BASINS. Conferees were appointed on H. R. 8667, to authorize additional appropriations for the prosecution of comprehensive plans for certain river basins. Senate conferees have already been appointed. p. 22231
21. LEGISLATIVE PROGRAM. Rep. Albert announced that on Mon., Dec. 9, the House will consider the conference reports on H. R. 7885, the foreign aid authorization bill, and H. R. 6518, to prevent air pollution; and that, beginning Wed., H. R. 8720, to amend the Manpower Development and Training Act, will be considered. p. 22388

ITEMS IN APPENDIX

22. COTTON. Speeches in the House by Reps. Casey, Berry, and Short during debate on the Cooley cotton bill. pp. A7413, A7416, A7430-1
23. FUTURES TRADING. Extension of remarks of Rep. McIntire inserting an article concerning trading of cottonseed oil and soybean oil futures and including a charge that FAS is "directing a planned cutback in foreign aid shipments of vegetable oils well below previous export forecasts made by Agriculture." pp. A7420-1
24. LOANS. Extension of remarks of Rep. Montoya urging that authority be given to Farmers Home Administration to make grants to small rural communities for development of rural community services. p. A7428
25. WHEAT. Speech in the House by Rep. Nelsen urging a better voluntary program for wheat growers. pp. A7431-2

26. EXPENDITURES. Extension of remarks of Rep. Pelly stating that "while Congress this year is setting a record for slow action on annual appropriations bills, it also may well establish an outstanding record for budget cutting." p. A 7432

27. PAY; PERSONNEL. Extension of remarks of Rep. Wallhauser inserting a letter from the Chairman of the Civil Service Commission appraising the Federal pay bill and discussing the possible need for passage of the bill. pp. A7433-4

BILLS INTRODUCED

28. WATER. H. R. 9364, by Rep. Leggett, to clarify the relationship of interests of the United States and of the States in the use of waters of certain streams to Interior and Insular Affairs Committee.

29. CONSERVATION. H. Res. 580, by Rep. Fraser, favoring the establishment of a North American Conservation Hall of Fame and Museum; to Interior and Insular Affairs Committee.

BILL APPROVED BY THE PRESIDENT

30. FEDERAL REGISTER. H. R. 2837, to amend the Federal Register Act so as to give the Administrative Committee of the Federal Register discretion as to techniques whereby books of the Code of Federal Regulations are updated (rather than requiring pocket supplements). Approved December 2, 1963 (Public Law 88-190).

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COMMITTEE HEARINGS DEC. 6:

Uniform policies relative to benefits and costs of multiple-purpose water resource projects, H. Interior (Cliff, FS, to testify).

Water pollution control bill, H. Public Works.

Vocational education bill, conferees (exec).

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Digest of CONGRESSIONAL PROCEEDINGS

OF INTEREST TO THE DEPARTMENT OF AGRICULTURE

OFFICE OF
BUDGET AND FINANCE

(For information only;
should not be quoted
or cited)

Issued Jan. 30, 1964
For actions of Jan. 29, 1964
88th-2nd; No. 15

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HIGHLIGHTS: House committee voted to report land-grant college water research center bill. Rep. Riehlman announced intention to introduce cigarette labeling bill. Sen. Humphrey commended food for peace program in Latin America. Sen. Magnuson inserted Sen. Humphrey's speech praising Administration policies and programs. Sen. Javits submitted and discussed measure to establish Commission on Revision of Agricultural Laws and Programs.

HOUSE

1. **RESEARCH.** The Interior and Insular Affairs Committee voted to report (but did not actually report) with amendment S. 2, to establish water resource research centers at the land-grant colleges and State universities and promote a more adequate national program of water research. p. D56

Both Houses received the annual report of the National Science Foundation (H. Doc. 209). pp. 1257, 1312

2. **TOBACCO.** Rep. Riehlman announced that he would introduce a bill to require cautionary labeling of cigarette containers to inform the younger people. pp. 1312-3

3. **RECLAMATION.** Received from the Interior Department a report on the Lower Teton Division, Teton Basin project, Idaho (H. Doc. 208). p. 1324

4. **PERSONNEL.** A subcommittee of the Post Office and Civil Service Committee voted to report to the full committee with amendment S. 1561, to amend the Federal Employees Health Benefits Act. p. D56

5. AGING. The Select Subcommittee on Education of the Education and Labor Committee voted to report to the full committee with amendment H. R. 7957, to provide assistance in the development of new or improved programs to help older persons and to establish in HEW an agency for the "Administration of Aging." p. D55
6. LEGISLATIVE PROGRAM. Rep. Albert announced that the House would meet on Sat., Feb. 1 and probably on Sat., Feb. 8, to consider the civil rights bill. p. 1311
7. ADJOURNED until Fri., Jan. 31. p. 1324

SENATE

8. SUPPLEMENTAL APPROPRIATIONS. Concurred in the House amendment to H. J Res. 875, the supplemental appropriations bill for fiscal year 1964, providing funds for the mental retardation program, federally impacted school districts, the National Defense Education Act, and the Mexican farm labor program. This bill will now be sent to the President. pp. 1276-7
9. ADMINISTRATION PROGRAMS. Sen. Magnuson inserted a speech of Sen. Humphrey commending the Administration's policies and programs, including area re-development, the food stamp program, food for peace, the school lunch program, and farm credit activities. pp. 1283-5
10. FOOD FOR PEACE. Sen. Humphrey inserted his speech before the conference of the Catholic inter-American cooperation program, in which he praised the food-for-peace program in Latin America. pp. 1267-7
11. LEGISLATIVE PROCESS. Continued debate on S. Res. 111, to permit Senate committees to meet while the Senate is in session until the end of the morning hour. pp. 1257-8, 1276, 1278, 1281-3.
12. FCIC. Received from this Department the annual report of the Federal Crop Insurance Corporation. pp. 1262-3
13. REPORTS. Received the annual reports of Commerce and General Services Administration. p. 1263
14. TAXATION. Sen. Douglas reviewed provisions of the proposed tax reduction bill, point out what he considered to be good and bad features of the bill, and discussed several features of the bill with Sen. Long. pp. 1287-1301
15. ELECTRIFICATION. Sen. Magnuson commended the signing by Canada and the U.S. of the revised Columbia River hydroelectric and flood-control treaty and inserted an editorial urging prompt implementation of the treaty. p. 1286

ITEMS IN APPENDIX

16. WHEAT. Extension of remarks of Rep. Purcell inserting and commending a Kan. Legislature resolution urging the Congress and the Secretary of Agriculture "to provide a voluntary type wheat program for the wheat producers of the Nation," and recommending that any legislation passed "should provide for the maintenance and improvement of income and also allow some of our wheat production to be competitive in the markets of the world." pp. A374-5

House Feb. 10, 1964

including a reference to activities of the Commodity Credit Corporation.
pp. 2556-8

11. TRANSPORTATION. Received from the Commerce Committee a report, "Implementation of the Cargo Preference Laws by the Administrative Departments and Agencies" (S. Rept. 871). p. 2559
Both Houses received from GAO an audit report of the financial statements of the St. Lawrence Seaway Development Corporation for calendar year 1962 (H. Doc. 222). pp. 2559, 2737
12. PUBLIC LANDS. Sen. Church inserted an address by Secretary of the Interior Udall, "The West and Its Public Lands: Aid or Obstacle to Progress?" pp. 2559-62
13. ELECTRIFICATION. Sen. Metcalf inserted a 1941 Federal Trade Commission report on its investigation of its own order into accounting disposition of expenditures by certain public utilities and a statement of the Commission's requirements for listing charges for professional services by electric utilities. pp. 2566-9
14. LEGISLATIVE PROGRAM. Sen. Mansfield stated that the Senate will recess from Thurs. until Mon., and that it "is possible that the period of recesses may be extended several days beyond that time." p. 2549
15. RECESSED until Thurs., Feb. 13. p. 2610

HOUSE

16. WATER RESEARCH. The Interior and Insular Affairs Committee reported with amendment S. 2, to establish water resource research centers at the land-grant colleges and State universities and promote a more adequate national program of water research (H. Rept. 1136). p. 2737
17. FEED GRAINS. Rep. Smith (Iowa) gave credit to the voluntary feed grain adjustment programs for preventing an increase carryover of stored feed grains, and praised the other agricultural commodity programs for serving both the farmer and the urban citizen. pp. 2732-3
18. FOREIGN TRADE. Rep. Lipscomb criticized the Rock Report, concerning the interdependence of the U.S.S.R. and the U. S., the recommendations of which, he claimed, are being followed by the U.S. Government and include suggestions for U.S. assistance of Soviet agriculture and the reduction of U.S. trade restrictions with the Soviets. pp. 2720-4
19. APPROPRIATIONS. Rep. Jensen inserted a statement by the Republican members of the Appropriations Committee criticizing the President's budget and complimenting Rep. Cannon for scheduling committee reports on appropriation bills as follows: agriculture May 8, Interior March 13, independent offices May 15, public works May 29, and foreign aid June 5. pp. 2713-4
20. HIGHWAYS. Received a report from the Comptroller General on legislative and policy requirements governing Federal participation in acquisition of rights-of-way and in other activities of the Federal-aid highway program in Calif. p. 2737

21. TRANSPORTATION. Received a report from the Comptroller General on the audit of the Inland Waterways Corporation for fiscal year 1963 (H. Doc. 223). p. 2737
22. CIVIL RIGHTS. By a vote of 290 to 130, passed with amendments H. R. 7152, the civil rights bill. pp. 2612-2709, 2715-6, 2724-32

As passed, the bill includes provisions as follows: Makes the Civil Rights Commission a permanent agency. Prohibits discrimination in any Federal financial assistance program. Establishes a Federal Equal Employment Commission designed to eliminate discriminatory employment practices.

Rejected the following amendments:

By Rep. Sikes, 86 to 131, to limit the life of the Equal Employment Opportunity Commission to 4 years. pp. 2613-4

By Rep. Dowdy, to limit the provisions pertaining to the Fair Employment Practices Commission to Government contracts and subcontracts. pp. 2627-32

By Rep. Berry, 95 to 149, to insert a new section which was originally introduced as H. R. 980, to provide a program for the American Indians in order to improve conditions among Indians on reservations and in other communities. pp. 2643-58

23. LEGISLATIVE PROGRAM. Rep. Albert announced that the House would adjourn until Thurs., Feb. 13, and then adjourn over to Mon., Feb. 17, when the next legislative business will be considered. p. 2714
24. ADJOURNED until Thurs., Feb. 13. p. 2737

ITEMS IN APPENDIX

25. FOREIGN TRADE. Extension of remarks of Rep. Fascell inserting an address, "Have the Words 'Made in U.S.A.' Lost Their Magic?", which establishes a background on the subject of world trade. pp. A627-8
26. PERSONNEL. Extension of remarks of Rep. Healey favoring early action on legislation to increase salaries of Federal employees. p. A630
27. LIVESTOCK; MEAT IMPORTS. Extension of remarks of Rep. Gurney stating that "by far the most serious problem now facing our American cattle industry is the drastic drop in the prices of beef and beef products," and inserting a resume of resolutions adopted by the Cattlemen's Association requesting import quotas, and asking that meat inspection be retained in ARS. pp. A653-4

BILLS INTRODUCED

28. MINERALS. S. 2500, by Sen. Metcalf, to amend section 27 of the Mineral Leasing Act of February 25, 1920, as amended, in order to promote the development of phosphate on the public domain; to Interior and Insular Affairs Committee
29. WATER POLLUTION. H. R. 9963, by Rep. Harsha, to amend the Federal Water Pollution Control Act to authorize an additional Assistant Secretary in the Department of Health, Education, and Welfare; to provide grants for research and development; to increase grants for construction of research sewage treatment works; to Public Works Committee.

COMMITTEE HEARINGS: Feb. 11: Wheat legislation, S. Agriculture (Secretary Freeman and Murphy to testify). Tax bill, conferees (exec). Feb. 18: Effects of pesticides on tobacco, S. Gov't Operations (Clarkson, ARS, to testify).

ESTABLISHING WATER RESOURCES RESEARCH CENTERS AT LAND-GRANT COLLEGES AND STATE UNIVERSITIES AND PROMOTING A MORE ADEQUATE NATIONAL PROGRAM OF WATER RESEARCH

FEBRUARY 10, 1964.—Committed to the Committee of the Whole House on the State of the Union and ordered to be printed

Mr. ROGERS of Texas, from the Committee on Interior and Insular Affairs, submitted the following

R E P O R T

[To accompany S. 2]

The Committee on Interior and Insular Affairs, to whom was referred the bill (S. 2) to establish water resources research centers at land-grant colleges and State universities, to stimulate water research at other colleges, universities, and centers of competence, and to promote a more adequate national program of water research, having considered the same, report favorably thereon with an amendment and recommend that the bill as amended do pass.

The amendment is as follows:

Strike out all after the enacting clause and insert the following language:

That (a) this Act may be cited as the "Water Resources Research Act of 1964."

(b) In order to assist in assuring the Nation at all times of a supply of water sufficient in quantity and quality to meet the requirements of its expanding population, it is the purpose of the Congress, by this Act, to stimulate, sponsor, provide for, and supplement present programs for the conduct of research, investigations, experiments, and the training of scientists in the fields of water and of resources which affect water.

TITLE I—STATE WATER RESOURCES RESEARCH INSTITUTES

SEC. 100. (a) There are authorized to be appropriated to the Secretary of the Interior for the fiscal year 1965 and for each of the nine fiscal years subsequent thereto sums adequate to provide \$75,000 to each of the several States in the first year, \$87,500 in each of the second and third years, and \$100,000 each year thereafter to assist each participating State in establishing and carrying on the work of a competent and qualified water resources research institute, center, or equivalent agency (hereinafter referred to as "institute") at one college or university in that State, which college or university shall, unless otherwise provided by act of the legislature of the State concerned, be a college or university established in accordance with the Act approved July 2, 1862 (12 Stat. 503), entitled "An Act donating public lands to the several States and territories which may

provide colleges for the benefit of agriculture and the mechanic arts": *Provided*, That (1) if there is more than one such college or university in a State, established in accordance with said Act of July 2, 1862, funds under this Act shall, in the absence of a designation to the contrary by act of the legislature of the State, be paid to the one such college or university designated by the Governor of the State to receive the same, subject to the Secretary's determination that such college or university has, or may reasonably be expected to have, the capability of doing effective work under this Act; (2) two or more States may cooperate in the designation of a single interstate or regional institute, in which event the sums assignable to all of the cooperating States shall be paid to such institute; and (3) a designated college or university may, as authorized by appropriate State authority, arrange with other colleges and universities within the State to participate in the work of the institute.

(b) It shall be the duty of each such institute to plan and conduct and/or arrange for a component or components of the college or university with which it is affiliated to conduct competent research, investigations, and experiments of either a basic or practical nature, or both, in relation to water resources and to provide for the training of scientists through such research, investigations, and experiments. Such research, investigations, experiments, and training may include, without being limited to, aspects of the hydrologic cycle; supply and demand for water; conservation and best use of available supplies of water; methods of increasing such supplies; and economic, legal, social, engineering, recreational, biological, geographic, ecological, and other aspects of water problems, having due regard to the varying conditions and needs of the respective States, to water research projects being conducted by agencies of the Federal and State Governments, the agricultural experiment stations, and others, and to avoidance of any undue displacement of scientists and engineers elsewhere engaged in water resources research.

SEC. 101. (a) There is further authorized to be appropriated to the Secretary of the Interior for the fiscal year 1965 and for the nine fiscal years thereafter sums not in excess of the following: 1965, \$1,000,000; 1966, \$2,000,000; 1967, \$3,000,000; 1968, \$4,000,000; and 1969 and each of the five succeeding years, \$5,000,000. Such moneys when appropriated, shall be available to match, on a dollar-for-dollar basis, funds made available to institutes by States or other non-Federal sources to meet the necessary expenses of specific water resources research projects which could not otherwise be undertaken, including the expenses of planning and coordinating regional water resources research projects by two or more institutes.

(b) Each application for a grant pursuant to subsection (a) of this section shall, among other things, state the nature of the project to be undertaken, the period during which it will be pursued, the qualifications of the personnel who will direct and conduct it, the importance of the project to the water economy of the Nation, the region, and the State concerned, its relation to other known research projects theretofore pursued or currently being pursued, and the extent to which it will provide opportunity for the training of water resources scientists. No grant shall be made under said subsection (a) except for a project approved by the Secretary, and all grants shall be made upon the basis of the merit of the project, the need for the knowledge which it is expected to produce when completed, and the opportunity it provides for the training of water resources scientists.

SEC. 102. Sums available to the States under the terms of sections 100 and 101 of this Act shall be paid to their designated institutes in equal quarterly payments beginning on the 1st day of July of each fiscal year upon vouchers approved by the Secretary. Each institute shall have an officer appointed by its governing authority who shall receive and account for all funds paid under the provisions of this Act and shall make an annual report to the Secretary on or before the 1st day of September of each year, on work accomplished and the status of projects underway, together with a detailed statement of the amounts received under any of the provisions of this Act during the preceding fiscal year, and of its disbursement, on schedules prescribed by the Secretary. If any of the moneys received by the authorized receiving officer of any institute under the provisions of this Act shall by any action or contingency be found by the Secretary to have been improperly diminished, lost, or misapplied, it shall be replaced by the State concerned and until so replaced no subsequent appropriation shall be allotted or paid to any institute of such State.

SEC. 103. Moneys appropriated pursuant to this Act, in addition to being available for expenses for research, investigations, experiments, and training conducted under authority of this Act, shall also be available for printing and publishing the results thereof and for administrative planning and direction.

The institutes are hereby authorized and encouraged to plan and conduct programs financed under this Act in cooperation with each other and with such other agencies and individuals as may contribute to the solution of the water problems involved, and moneys appropriated pursuant to this Act shall be available for paying the necessary expenses of planning, coordinating, and conducting such cooperative research.

SEC. 104. The Secretary of the Interior is hereby charged with the responsibility for the proper administration of this Act, and after full consultation with other interested Federal agencies, shall prescribe such rules and regulations as may be necessary to carry out its provisions. He shall require a showing that institutes designated to receive funds have, or may reasonably be expected to have, the capability of doing effective work. He shall furnish such advice and assistance as will best promote the purposes of this Act, participate in coordinating research initiated under this Act by the institutes, indicate to them such lines of inquiry as to him seem most important, and encourage and assist in the establishment and maintenance of cooperation by and between the institutes and between them and other research organizations, the United States Department of the Interior, and other Federal establishments.

On or before the 1st day of July in each year after the passage of this Act, the Secretary shall ascertain whether the requirements of section 102 have been met as to each State, whether it is entitled to receive its share of the annual appropriations for water resources research under section 100 of this Act, and the amount which it is entitled to receive.

The Secretary shall make an annual report to the Congress of the receipts and expenditures and work of the institutes in all States under the provisions of this Act. His report shall indicate whether any portion of an appropriation available for allotment to any State has been withheld and, if so, the reasons therefor.

SEC. 105. Nothing in this Act shall be construed to impair or modify the legal relation existing between any of the colleges or universities under whose direction an institute is established and the government of the State in which it is located, and nothing in this Act shall in any way be construed to authorize Federal control or direction of education at any college or university.

TITLE II—MISCELLANEOUS PROVISIONS

SEC. 200. The Secretary of the Interior shall obtain the continuing advice and cooperation of all agencies of the Federal Government concerned with water problems, of State and local governments, and of private institutions and individuals, to assure that the programs authorized in this Act will supplement and not duplicate established water research programs, to stimulate research in otherwise neglected areas, and to contribute to a comprehensive, nationwide program of water and related resources research. He shall make generally available information and reports on projects completed, in progress, or planned under the provisions of this Act, in addition to any direct publication of information by the institutes themselves.

SEC. 201. Nothing in this Act is intended to give or shall be construed as giving the Secretary of the Interior any authority or surveillance over water resources research conducted by any other agency of the Federal Government, or as repealing, superseding, or diminishing existing authorities or responsibilities of any agency of the Federal Government to plan and conduct, contract for, or assist in research in its areas of responsibility and concern with water resources.

SEC. 202. Contracts or other arrangements for water resources work authorized under this Act with an institute may be undertaken without regard to the provisions of section 3684 of the Revised Statutes (31 U.S.C. 529) when, in the judgment of the Secretary of the Interior, advance payments of initial expense are necessary to facilitate such work.

SEC. 203. No part of any appropriated funds may be expended pursuant to authorization given by this Act for any scientific or technological research or development activity unless such expenditure is conditioned upon provisions determined by the Secretary of the Interior, with the approval of the Attorney General, to be effective to insure that all information, uses, products, processes, patents, and other developments resulting from that activity will (with such exceptions and limitations as the Secretary may determine, after consultation with the Secretary of Defense, to be necessary in the interest of the national defense) be made freely and fully available to the general public. Nothing contained in this subsection shall deprive the owner of any background patent relating to any such activity of any rights which that owner may have under that patent.

SEC. 204. There shall be established, in such agency and location as the President determines to be desirable, a center for cataloging current and projected scientific research in all fields of water resources. Each Federal agency doing water resources research shall cooperate by providing the cataloging center with information on work underway or scheduled by it. The cataloging center shall classify and maintain for general use a catalog of water resources research and investigation projects in progress or scheduled by all Federal agencies and by such non-Federal agencies of government, colleges, universities, private institutions, firms, and individuals as voluntarily may make such information available.

SEC. 205. The President shall, by such means as he deems appropriate, clarify agency responsibilities for Federal water resources research and provide for inter-agency coordination of such research, including the research authorized by this Act. Such coordination shall include (a) continuing review of the adequacy of the Government-wide program in water resources research, (b) identification and elimination of duplication and overlaps between two or more agency programs, (c) identification of technical needs in various water resources research categories, (d) recommendations with respect to allocation of technical effort among the Federal agencies, (e) review of technical manpower needs and findings concerning the technical manpower base of the program, (f) recommendations concerning management policies to improve the quality of the Government-wide research effort, and (g) actions to facilitate interagency communication at management levels.

SEC. 206. As used in this Act, the term "State" includes the Commonwealth of Puerto Rico.

Amend the title so as to read:

An act to establish water resources research centers at land-grant colleges and State universities, to promote a more adequate national program of water research, and for other purposes.

Companion bills to S. 2 were introduced in the House by Mr. Morris (H.R. 2683), Mr. Teague of Texas (H.R. 2689), Mr. Matthews (H.R. 4048), Mr. Edmondson (H.R. 7234), Mr. Johnson of California (H.R. 7239), and Mr. Gray (H.R. 7258).

PURPOSE AND EXPLANATION

The purpose of this legislation is to strengthen the contribution that universities can make to water resources research and to graduate education in water resources. The expansion of water resources research that would be provided by the enactment of this legislation would be helpful in coping with the mounting water-use problems posed by the projected growth of our population and economy. The program would assist both in providing answers to our water problems at the local and State level and in meeting the critical need for additional hydroscintists. The Secretary of the Interior would be charged with the responsibility for proper administration of the program and for assuring that effective research work is conducted.

As approved by the committee, the legislation authorizes a water resources research grant program that provides for establishing research centers or institutes in a land-grant college or another institution in each State and in Puerto Rico. Sufficient funds are authorized to be appropriated so that each research center would receive a Federal grant of \$75,000 in the first year of the program, \$87,500 in the second and third years, and \$100,000 thereafter for the life of the program. Two or more States could cooperate in the establishment of a single interstate or regional research center, in which event the sums assignable to all of the cooperating States would be available to that research center.

Additional funds would be available to the research centers on a dollar-for-dollar matching basis. These funds would be allocated by

the Secretary of the Interior on the basis of specific research proposals by the research centers. The overall limitation on these matching funds would be \$1 million in the first year of the program, increasing to \$5 million in the fifth year and thereafter for the life of the program.

As approved by the committee, the legislation limits the life of the program to 10 years in order to give the Congress an opportunity to review the program and determine the need for extension, modification, etc.

In addition to establishing this new water resources research program, the legislation, as approved by the committee, provides for establishing a center for cataloging current and projected scientific research in all fields of water resources. In addition, it directs the President to clarify Federal agency responsibilities for water resources research and provide adequate interagency coordination of all water research activities.

JUSTIFICATION AND NEED

The rapid growth of population and industry in the United States has been accompanied by ever-expanding demands on our Nation's limited water resources. Growing urbanization, rapid industrialization expansion, and increased agricultural production are significant factors in the increased national requirements. The rather sudden national awareness of impending water shortages and the necessity for making the most effective use of the Nation's water resources has focused attention on water resources research.

The Senate Select Committee on National Water Resources, in its report in January 1961, indicated some of the fields in which research work needs to be accelerated, by the following language in its report:

* * * the committee believes that substantial research efforts are justified, looking toward exploration of all possibilities for increasing usable water supplies or making more efficient use of present supplies, by such means as:

(a) Reducing evaporation from the surface of reservoirs.

(b) Elimination of water-loving vegetation (phreatophytes) along the edges of watercourses and reservoirs.

(c) Changing or modifying a forest and vegetative cover on watersheds to reduce evapotranspiration.

(d) Reducing seepage losses in irrigation canals and other water distribution systems and other wasteful practices.

(e) Reduction of dilution requirements for pollution abatement by development of improved methods for treatment or control of waste materials that are disposed of in water.

(f) Waste water salvage.

(g) Reuse, recycling, and elimination of wasteful water use by industry.

(h) Desalting of saline or brackish water.

(i) Weather modification.

(j) More accurate quantitative forecasting of meteorologic events.

(k) Application of nuclear products in research.

(l) Improved use and control of ground water.

Additionally, the select committee suggested that, in the field of economics and social sciences, research should be undertaken on:

- (a) Economic incentives to assure conservation and better use of available supplies.
- (b) Alternative uses of water.
- (c) System planning.
- (d) Economic effects of existing projects.

The Committee on Interior and Insular Affairs believes that the provision for State or regional research centers connected with colleges or universities will contribute greatly to our national research effort. While there is general agreement that the Federal Government should assume a position of leadership in our overall water resources research effort, there is no doubt that a great contribution can be made at the State level, particularly in State educational institutions. Although the results of research conducted by State centers would be available throughout the country, much of the needed research must be undertaken in the geographical areas concerned. Regional variations in water resources problems can be better attacked by a State research center than by a single consolidated central facility.

One important reason why this water research effort should be undertaken at State level rather than exclusively by Federal agencies is the large differences in the problems that exist among the States. These differences involve not only great variations in the nature of the resource itself and the degree to which the resource has been developed but also in the detail of the economic and social structure. Differences in climate, elevation, and soil have generated considerable differences in problems of agricultural use of water. The differences in the economic-social detail as among States may even be greater than the resource differences. The particular lines which future economic development may take are greatly influenced by the nature of natural resources other than water, by transportation, the degree of urbanization, educational activities, recreational needs, etc. These differences lead to different policies and objectives.

Linking research and education in the water field add new dimensions to the potential of the proposed research effort. In addition to providing needed answers to our many troublesome water problems, this approach is expected to provide a continued flow of competent trained scientific manpower into water resources research. At the present time there is a shortage of personnel qualified to undertake creative research in the many scientific disciplines related to water resources. There is a very narrow manpower base for the conduct of research in water resources. The needed expansion in this field will require attracting scientists, engineers, and other specialists to water research activities. Otherwise, expansion in one aspect of water research will be possible only by diversion of personnel from other aspects.

The research centers that would be established under this legislation would bring to bear on our water problems a multidisciplinary faculty and staff skilled in the fields of engineering, in the physical, chemical, biological, and social sciences, and in management. The creation of these research centers would provide the nuclei around which well coordinated, interdisciplinary research could develop. Also, the presence of a water resource research center within a college or university would encourage the development or expansion of cur-

riculums in this field. These are the factors which it is believed would provide the stimulus which would alleviate the shortages of broadly trained people, capable of planning and executing effective research programs.

USING COLLEGES AND UNIVERSITIES

The need for wider use of colleges and universities for research and training of greater numbers of needed scientists has been widely recognized.

Report No. 1 of the President's Science Advisory Commission on "Meeting Manpower Needs in Science and Technology," declares:

Additional first-rate educational opportunities should be located in such manner as to serve all geographic areas more effectively. Centers of excellence serving more regions and States would stimulate and spread economic progress because, as recent experience has shown, industry tends to concentrate around leading institutions of science and technology. In addition to enlarging present programs, special arrangements will be required to assist areas of the country which now possess inadequate foundations for an effective graduate education program.

The President's Committee also found:

Nowhere are the benefits of scientific research more dramatically revealed than in food production. Fifty years ago in this country an agricultural worker produced food for only 3 or 4 others in contrast to his capability to feed 27 individuals today.

This accomplishment can be directly attributed to research that has been systematically supported by the Federal Government, the States, and private sources, in programs that have historically and effectively linked education and research. As a consequence, universities have been eminently able to meet changing needs.

The Committee on Natural Resources of the National Academy of Sciences, National Research Council, in its study of the status of natural resources research for the President, has come to the conclusion that:

In adapting their research programs and activities to the requirements of the problems outlined in this report, governmental and nongovernmental agencies and institutions should take full advantage of the resources of the universities, contracting out especially those studies for which the universities are uniquely equipped. It should be remembered that an important byproduct of the university research is the training that accompanies it, and the Committee reemphasizes the need for training research workers to deal effectively with the problems relating to natural resources. These problems require closer cooperation between natural and social scientists.

The National Academy group concluded that the Federal Government should "enlist the potentials of land-grant institutions" and that:

These institutions should be encouraged to extend their interest to cover the total span of natural resources, particularly as they relate to the future well-being of the areas they serve. For example, these institutions in the coastal States could develop fisheries experiment stations similar to the agricultural experiment stations which have so successfully aided the development of agriculture in the United States.

The faculties of these universities should be called upon to serve as advisers and assistants to local and State agencies with responsibilities for resource development, planning, and management.

The Water Resources Committee of the National Academy study, headed by Dr. Abel Wolman, of Johns Hopkins University, emphasized the need for interdisciplinary training of personnel. They reported:

The most critical shortage in the field of water resources by far is the very real shortage of broadly trained people capable of planning and executing effective research programs. At present, we have no institutional structure in the United States to take care of multidisciplinary research in water. The whole hydrosciences field is now pathetically limited for the tasks involved. To strengthen it will require immediate provision of a program to enlist and train new people in a great many of the disciplines relating to water resources. The ultimate objective should be the development of a new structure and a new generation of well-rounded water scientists ready and able to approach the Nation's multidisciplinary water-resources problems in a unified manner as hydrosciences.

The group studying social and economic aspects of natural resources, under Dr. Gilbert F. White, of the University of Chicago, for the National Academy reported:

* * * much of the needed study (in natural resource fields) will cut across conventional lines of Government bureaus and university departments * * *.

One of the more promising channels for this research is in the system of land-grant universities and regional agricultural research institutions. Acceptance by them of enlarged responsibilities in the field of natural resources would be a reasonable extension of their present rapidly shifting activities.

COMMITTEE AMENDMENTS

The committee's decision to rewrite the entire bill was made after full and careful analysis of the language of S. 2 as passed by the Senate and is based upon the extent of amendments and changes adopted. While many of the changes are minor and clarifying in nature, there are major differences between the Senate-passed bill and the language approved by the committee.

Scope of program

The major change is the deletion of title II in the Senate-passed bill entitled "Additional Water Resources Research Programs." The cost of the research program that this title would have authorized was \$5 million in the first year of the program increasing to \$10 million in the fifth year and thereafter. Thus, the program under this title represented about half of the approximately \$20 million program embodied in the Senate-passed bill.

There are several reasons why the committee rejected, at this time, the title II part of the research program. First, the committee felt that since we are plowing new ground with this type of research, a more modest approach should be taken initially. Next, the authorizing language in title II was extremely broad, providing no controls or guidance to the Secretary of the Interior in the administration of the research program. This is not the case with the other part of the program as indicated by the fact that the language relating specifically to State research centers takes up some 7 pages in the bill while title II took up 11 lines. The only requirement placed upon title II research was that it relate to the mission of the Department of the Interior. The agencies of the Department of the Interior, of course, already have authority for conducting research relating to their activities and the Geological Survey is conducting water research which contributes to our overall Government effort in this field.

Very little of the testimony received by the committee was directed to title II and the committee feels that the need for it at this time was not demonstrated. The committee believes that the State or university research program would be an adequate step forward in this field at the present time, especially in view of the present shortage of qualified scientists and technicians to perform water research. Also, the committee would like to see how the university research program progresses and to review the accomplishments therefrom before embarking on a permanent major program involving financial assistance for non-Federal water research work, and this position is implemented by the language adopted to limit the life of the program to 10 years.

Coordination

A second major change involves the matter of coordination of water research activities. The committee changed the language relating to the cataloging function and added language relating to coordination of water resources research programs of the various Federal agencies. The Senate-passed bill gives the Secretary of the Interior initially the authority and responsibility for cataloging current and projected scientific research in all fields of water resources. The committee feels that this function should be outside of any of the departments or agencies having operating responsibilities in connection with water resources. The language adopted by the committee directs the President to establish a cataloging center, without specifying by what means or which agency or office should be given the responsibility. It is understood that, under the committee-approved language, the responsibility would probably be given to the Office of Science and Technology and that the cataloging would be done by the Science Information Exchange in the Smithsonian Institution.

The cataloging function is very important as a step in achieving coordination; but the cataloging and coordination of water resources research is but a part of the larger problem extending across all science. The executive branch is attempting, at the present time, to strengthen this area of information through the Science Information Exchange. It would seem unwise to establish, for water resources research, a separate mechanism which is isolated from and not cross-referenced to or consistent with the larger effort. The Science Information Exchange already has responsibilities in the water field as well as other areas of science.

The Senate-passed bill contains no language specifically directed to coordination of water resources research programs of the various Federal agencies. The committee feels very strongly that language directing such coordination is needed. The committee added language to the bill which directs the President to clarify Federal agency responsibilities for water resources research and to provide adequate interagency coordination of all water research activities, including the research that would be authorized by this legislation. A great deal of the testimony and many of the questions of committee members were directed to the matter of coordinating water resources research presently being conducted by Federal agencies and the need for eliminating duplication and waste. There are presently 5 departments and 3 separate agencies with a total of some 23 different agencies conducting water resources research in connection with their authorized missions. Approximately \$76 million was appropriated this year for water research activities and the amounts requested for water research are increasing every year.

There has been evidence that there is some duplication of effort among the many agencies conducting water research. At the present time the Office of the President is attempting to coordinate these research activities more adequately than they have been coordinated in the past. The study and report of the Special Task Group on Coordinated Water Resources Research, which was completed about a year ago, stems from this need for better coordination. This special task group was established by the Federal Council for Science and Technology. As a result of this study, a Coordinating Committee on Water Resources Research has been established. Whether this Committee is given the coordinating responsibility or some other office or group is designated, the direction to the President included in this legislation should provide the authority needed to clarify and limit agency responsibilities and provide full and effective coordination of all water resources research activities.

Number of Research Centers

The committee adopted language providing grants for only one research center in each State. The annual grant would go to the land-grant college in each State unless the State legislature designated some other institution. The language of the Senate-passed bill would permit the establishment of a water resources research center in more than one educational institution in each State. This would mean that in those States where several educational institutions were designated, the grant to that State would have to be divided among all of the institutions. The committee felt that dissipation of the funds to this extent would not produce the results expected from the research. It should be pointed out that the division among 50 States

and Puerto Rico is already spreading the funds pretty thin. Further dissipation seems unwise to the committee. As a matter of fact, the committee's sentiment runs the other way and this led to the adoption of language permitting and encouraging two or more States to cooperate in the designation of a single interstate or regional research center.

SECTION-BY-SECTION ANALYSIS ON COMMITTEE-APPROVED BILL

Section 1 declares it be the policy and purpose of the Congress, in order to assure an abundance of water to meet the Nation's expanding needs, to stimulate, sponsor, and provide for research and the training of scientists in the fields of water and of resources which affect water.

TITLE I—STATE WATER RESOURCES RESEARCH INSTITUTES

Section 100(a) authorizes appropriations to the Secretary of the Interior for a 10-year water resources research grant program. The amounts authorized to be appropriated would provide support for a water resources research center in the land-grant college in each State and in Puerto Rico or such other college or university as the State legislature might designate. Each research center would be entitled to receive \$75,000 the first year of the program, \$87,500 in the second and third years, and \$100,000 each year thereafter for the life of the program. If there is more than one land-grant college in a State, the funds would be paid to the one designated by the Governor unless the designation was made by the legislature. In all cases, the institutions designated would have to be found capable by the Secretary of the Interior of doing effective research work. This section also would permit two or more States to cooperate in the designation of a single interstate or regional research center or institute, in which event the sums assignable to all of the cooperating States would be paid to that institute. Although the grant to each State would be made to one college or university, arrangements could be made with other colleges and universities within the State to participate in the research work.

Section 100(b) states the requirement that the research centers conduct competent research of either a basic or practical nature relating to water resources and provide for the training of scientists through such research. This section requires also that due regard be given to research needs, research projects being conducted by others, and to avoidance of undue displacement of scientists and engineers elsewhere engaged.

Section 101(a) authorizes the appropriation of additional funds to be made available to the State research centers on the basis of specific research proposals. The overall amount authorized to be appropriated would be \$1 million in the first year of the program increasing to \$5 million in the 5th year and thereafter through the 10th year. These funds would be made available on a dollar-for-dollar matching basis. The research proposals could include regional research projects by two or more of the institutes.

Section 101(b) provides guidance to the institutes in the preparation of applications for grants pursuant to subsection 101(a). It requires that all grants be made on the basis of the merit of the research project, the need for the knowledge that is expected to be gained, and the

opportunity it provides for training technicians and scientists. The research project would have to be approved by the Secretary of the Interior.

Section 102 sets out the details for annual payments to the State institutes and requires an accounting by the institutes for all funds provided under the act. It also requires that each institute report annually on the research work accomplished.

Section 103 provides that the funds made available to the research institutes can be used, in addition to research work, for printing and publishing the results of research and for administrative planning and direction. This section also includes language which encourages cooperative research and makes it clear that funds are available for paying the necessary expenses of planning, coordinating, and conducting such cooperative research work.

Under section 104, the Secretary of the Interior is charged with the responsibility for proper administration of the act and the research program authorized by it. He is required to consult with other interested Federal agencies and to make a determination that the State research institutes have the capability of doing effective work. He is required to advise and assist the institutes and coordinate their activities with other institutes, agencies of the Department of the Interior, and other Federal agencies. The language in this section requires the Secretary to make an annual report to the Congress with respect to receipts and expenditures and the work of the research institutes.

Section 105 provides that nothing in this legislation is to be construed to impair or modify the legal relation between any of the colleges or universities and the government of the State in which they are located, and that nothing in the act shall be construed to authorize Federal control or direction of education at any college or university.

TITLE II—MISCELLANEOUS PROVISIONS

Section 200 requires the Secretary, in connection with administration of this program, to obtain the continuing advice and cooperation of all agencies of the Federal Government concerned with water problems, as well as the advice and cooperation of State and local governments and private institutions and individuals, in order that the research work under the program will not duplicate other water research programs or research work being conducted elsewhere and in order to stimulate research in otherwise neglected areas. The Secretary is required to make generally available to those interested the information and reports that are produced by the program.

Section 201 makes it clear that the Secretary is not given any authority or surveillance over water resources research being conducted by any other Federal agency. This section makes it clear also that this legislation does not repeal, supersede, or diminish existing authorities or responsibilities of other Federal agencies for planning and conducting water resources research.

Section 202 provides that the contract arrangements for research work under this act may be undertaken without regard to the provisions of section 3684 of the Revised Statutes when the Secretary determines that advance payments of initial expense are necessary to facilitate the research work.

Section 203 relates primarily to patents and provides that no part of the funds made available under the act may be expended for any research work unless the expenditure is conditioned upon provisions which insure that all information, uses, products, processes, patents, etc., will be made freely and fully available to the general public.

Section 204 directs the President to establish a center for cataloging current and projected scientific research in all fields of water resources. The language requires each Federal agency doing water research work to cooperate in this endeavor.

Section 205 directs the President to clarify agency responsibilities for Federal water resources research and provide for effective inter-agency coordination of such research, including the research authorized by this legislation. The language sets out several items which shall be considered in the coordination that is required.

DEPARTMENTAL RECOMMENDATIONS

Favorable reports were received from the Department of the Interior, the Department of Agriculture, Department of the Army, Department of Health, Education, and Welfare, the Bureau of the Budget, the Office of Science and Technology, and the Comptroller General. These reports follow:

DEPARTMENT OF THE INTERIOR,
OFFICE OF THE SECRETARY,
Washington, D.C., June 21, 1963.

HON. WAYNE N. ASPINALL,
*Chairman, Committee on Interior and Insular Affairs,
House of Representatives, Washington, D.C.*

DEAR MR. ASPINALL: This responds to your request for the views of this Department on H.R. 2683, H.R. 2689, H.R. 4048, and S. 2, similar bills to establish water resources research centers at land-grant colleges and State universities, to stimulate water research at other colleges, universities and centers of competence, and to promote a more adequate national program of water research. The bills provide that the legislation would be known as the Water Resources Research Act.

We strongly recommend enactment of this legislation. It will make a notable contribution to the advancement of the knowledge on which sound decisions on the conservation, utilization, and development of our water resources must be based.

Title I of the bills authorizes the Secretary of the Interior to provide financial assistance to States and Puerto Rico in the annual amount of \$75,000 the first year, increasing to \$100,000 the third year and thereafter, for the purpose of establishing a collegewide or university-wide water resources research institute, center, or equivalent agency at a land-grant college or such other institution of higher education as the State may determine. When desired by the individual State, the formula money may be shared among more than one institution or may be paid to a regional center. Each such center would have the responsibility to plan and conduct or arrange for components of colleges or universities to conduct a broad program of basic or applied research relating to water resources. In addition, title I authorizes appropriations to the Secretary of the Interior in the amount of \$1 million the first year, increasing to \$5 million annually the fifth year

and thereafter, for grants to the centers for the necessary expenses of water resources research projects, including related costs for administration, buildings, and equipment. The Federal contribution to the cost of such research would be matched on a cash equivalent basis by the States or other non-Federal sources.

Title II authorizes appropriations to the Secretary of the Interior in the amount of \$5 million the first year, increasing to \$10 million annually the fifth year and thereafter for research grants to or contracts with institutions, firms, and governmental agencies for research into any aspects of water problems related to the mission of the Department of the Interior.

Title III contains miscellaneous provisions.

The proposed Water Resources Research Act is addressed to one of the most important problems which will confront this Nation with increasing severity in the years ahead. It is axiomatic that the availability of adequate supply of good quality water affects all of man's pursuits. Yet we are now using all of the readily available water supply, and use requirements will double by 1980. By that time many regions of the country will be faced with potential water shortages. The competing demands for water for its many purposes will render even more critical the need for wise decisions as to its use. The correctness of these choices in turn will depend in a large measure on the availability and quality of our knowledge about water in its many aspects. The Water Resources Research Act will promote the acquisition of this knowledge by supplementing the existing Federal, State, and private activities in the field of water research and investigation.

The provisions of the proposed Water Resources Research Act represent the consensus of many experts in and out of Government who have studied our water resources research programs over the period of a number of years. The approach stated in the legislation is adapted from the pattern of the highly successful Hatch Act under which college-based agriculture experiment stations in the States have contributed so successfully to the improvement of agricultural production in this country.

Central to the significance of the legislation is the establishment of water resources research centers at land-grant colleges or other institutions of higher education. All studies of this field of research have pointed to the critically limited availability of competent research scientists and engineers in the disciplines related to water resources. The key importance of utilizing institutions of higher education both for enlarging our knowledge through research and for training scientists and engineers is attested by a distinguished series of authorities. As stated in the President's Science Advisory Committee's 1960 Report of the Panel on Basic Research and Graduate Education, "science and the making of scientists go best together." In the words of Prof. Abel Wolman, Chairman of the Water Resources Study of the National Academy of Sciences-National Research Council: "At present, we have no institutional structure in the United States to take care of multidisciplinary research in water. The whole hydrosciences field is now pathetically limited for the tasks involved." Enactment of the Water Resources Research Act will serve substantially to fill this void.

The legislation will authorize the establishment of research centers or equivalent agencies in each State or region of the Nation, with participation by one or more college or university as each State may

determine best suited to its needs. This will permit competent investigation to be carried forward into local and regional water problems, as well as fundamental research into the basic properties of this life-essential compound, and its supply, availability, and use. Every State, every locality, has its water problems. Establishment of the centers will make experts readily available to State and local officials to help solve local problems. Implicit in the bill, furthermore, is an obligation to provide a substantial amount of non-Federal financing for any State water resources research center and its research programs. This assures that such centers will be established in response to valid needs recognized by the States which they serve.

The broad concept of the nature of water resources research explicit in the proposed legislation is of key importance. As defined in the bills, such research comprehends the horizon of physical and social sciences, and engineering. From our own experience in the Interior Department, we are well aware that the disciplines of economics as well as hydrology, of ecology as well as geology, of law as well as physics, are essential elements in developing the knowledge required for dealing with complex water resources problems. It is especially because interdisciplinary research is essential for water resource problems that institutions of higher education can develop the needed approaches. Under appropriate arrangements for coordination, college and university faculties of engineering, agriculture, natural sciences, economic and social sciences, and law can jointly attack the many-faceted research problems.

For like reasons, it is desirable to enlist competence wherever it exists to undertake research into problems not otherwise being studied. Title II of the bill meets this objective by providing basic authority to the Secretary of the Interior for a program of extramural research into any aspects of water problems related to the mission of this Department. Under this program, research grants or contracts can be made on a matching or other basis with the State water resources research agencies or other institutions or Government agencies, or with private firms or individuals, where desirable to fulfill the requirements of a sound research program.

H.R. 2683, H.R. 2689, and H.R. 4048 are identical with S. 2 as originally introduced. Before passing the bill, the Senate adopted a number of amendments. We do not object to these changes. Section 302, authorizing the establishment of a Water Resources Service in this Department, and section 303, relating to supergrade positions, were eliminated on the assurance that the Secretary of the Interior has broad authority under Reorganization Plan No. 3 of 1950 to establish within the Department an agency to administer the program free of dominance by existing bureaus and offices, and that sufficient authority also exists for the creation of supergrade positions, so that special provision is not required to provide adequately competent and independent staff.

The new section 304 will protect the public interest in any patents which might be developed as a result of the Government-financed research. The language of the section is similar to that in the Anderson-Aspinall Act (Public Law 87-295; 75 Stat. 628). As in the case of the saline water statute, we interpret the words "patents" and "general public" as meaning U.S. patents and the general public in the United States. Additionally, we construe the word "products" as being limited to the intellectual products of the research, i.e., the ideas

resulting therefrom. To avoid possible ambiguity, we suggest that the term be clarified to read "intellectual products." In the alternative, the word "products" can be eliminated altogether, inasmuch as the thought encompassed in "products" is fully expressed in "information, uses, processes, patents and developments."

We suggest that the second paragraph of section 104 of S. 2, as amended in the Senate, be clarified by the insertion of a comma on line 16 of page 7 between "State" and "whether" to show that the added clause referring to section 101 is not intended as a limitation on the remainder of the sentence.

Enclosed is our 5-year estimate of personnel and other costs as required by the act of July 25, 1956 (5 U.S.C. 642a). In preparing these estimates, we have anticipated that the centralized administrative staff, although high in caliber, would be quite small in numbers. It also is our intention to rely heavily on an extensive series of highly competent consultants for guidance in selection of research proposals for assistance. This would bring to the Government the best counsel in the various scientific and engineering fields available outside of the Federal Government.

The Bureau of the Budget advises that enactment of this legislation would be in accord with the program of the President.

Sincerely yours,

(Signed) STEWART L. UDALL,
Secretary of the Interior.

Enclosure.

Estimated additional man-years of civilian employment and expenditures for the 1st 5 years of proposed new program

	19CY	19CY+1	19CY+2	19CY+3	19CY+4
Estimated additional man-years of civilian employment:					
Supervisory and professional.....	4.5	7	9	11	12
Clerical.....	8.0	13	18	22	25
Consultants (w.a.e.).....	12.0	13	14	15	16
Total, estimated additional man-years of civilian employment.....	14.5	23	31	38	43
Estimated additional expenditures:					
Personal services.....	\$165,000	\$265,000	\$355,000	\$425,000	\$475,000
All other.....	6,700,000	10,500,000	14,000,000	16,400,000	18,500,000
Total, estimated additional expenditures.....	6,865,000	10,765,000	14,355,000	16,825,000	18,975,000

¹ 1 man-year equivalent to 300 man-days.

DEPARTMENT OF AGRICULTURE,
Washington, D.C., July 9, 1963.

HON. WAYNE N. ASPINALL,
Chairman, Committee on Interior and Insular Affairs,
House of Representatives.

DEAR MR. CHAIRMAN: We wish to thank you for your letter of May 21, 1963, giving us the opportunity to report on H.R. 2683, H.R. 2689, H.R. 4048, and S. 2. The bills are entitled, "To establish water resources research centers at land-grant colleges and State universities, to stimulate water research at other colleges, universities, and centers of competence, and to promote a more adequate national program of water research."

The bills all have similar objectives of authorizing appropriations to each of the States to help finance a collegewide or universitywide water resources research institute, center, or equivalent agency. There is further authorized an additional appropriation which the Secretary of the Interior may use to match State or other non-Federal source funds for specific water resources projects. The bills contain certain miscellaneous provisions related to the administration of programs proposed under the bills.

This Department supports the purposes of these bills, as they would stimulate water resources research in colleges and universities, thereby strengthening the overall research in this significant field and at the same time helping to train new scientists and engineers that are much needed for research and teaching in this area.

Agriculture's tremendous responsibility in the effective use of water is evident when we consider some of the data on water use and management. The average annual precipitation for the conterminous United States is 4.75 billion acre feet. The first impact of this primary water supply is on the surface of the land. The nature of vegetative cover, slope, soil characteristics, cropping patterns, and conservation practices exert the first determination whether precipitation becomes surface runoff, deep percolation, or soil moisture for evapotranspiration. The lion's share of this total water supply—3.38 billion acre feet—presently is used by evapotranspiration from vegetative lands. The remaining 1.37 billion acre feet constitute the massed water supply available to the Nation. Irrigation agriculture is dependent on this supply and accounts for 90 percent of the water that is consumptively used.

How land in farms and forest, and rangeland not in farms, are managed has a tremendous impact on the potential yield and use of water. In fact, water, soil, and vegetation are so closely related that they cannot be managed separately. Thus, it has been logical and necessary for the U.S. Department of Agriculture to develop programs of soil and water research and watershed management over the past 50 or 60 years. The close association in the U.S. Department of Agriculture between research and action in land and water use is of great importance. Each serves the other. Action programs in the U.S. Department of Agriculture dealing with more than three-fourths of the land area in the United States are principal users and often the first to use research results. They provide practical tests for research and point the way to new investigations. Also, research is often directed to specific management problems.

This partnership of research and management in the U.S. Department of Agriculture has produced an understanding of the close association of soil, water, and vegetation resources. The long background of experience and interest has established in the Department a capability acquired through a long tradition of scientific research. This has enabled it to make the major contribution to progress in the entire field of soil and water conservation research. The Department of Agriculture has a long history of effective cooperative and coordinated work with the program of the land-grant colleges as established under the Morrill Act of 1862, including cooperative work carried out under the Hatch Act of 1887.

This Department questions whether it is the most effective form of organization to authorize one department participating in water research to exercise a coordinating role in relation to the activities of

other departments carried out under existing authority of such departments. This Department would not object to the coordinating provisions of the bills if they are interpreted as covering only the coordination of programs authorized therein, so as to assure that such programs do not duplicate programs otherwise authorized.

This Department believes that the overall coordinating role should be vested in the Executive Office of the President. We would also prefer a bill which authorizes all departments having existing authority in the field of water research to make grants therefor.

The Bureau of the Budget advises that there is no objection to the presentation of this report from the standpoint of the administration's program.

Sincerely yours,

ORVILLE L. FREEMAN, *Secretary.*

DEPARTMENT OF THE ARMY,
Washington, D.C., July 22, 1963.

HON. WAYNE N. ASPINALL,
Chairman, Committee on Interior and Insular Affairs,
House of Representatives.

DEAR MR. CHAIRMAN: Reference is made to your request to the Secretary of Defense for the views of the Department of Defense with respect to S. 2, H.R. 2683, H.R. 2689, and H.R. 4048, 88th Congress, an act and bills to establish water resources research centers at land-grant colleges and State universities, to stimulate water research at other colleges, universities, and centers of competence, and to promote a more adequate national program of water research. The Department of the Army has been assigned responsibility for expressing the views of the Department of Defense on this legislation.

Title I of the proposed legislation would authorize appropriation of \$75,000 annually, increasing to \$100,000 in the third year, to each of the States to help finance a collegewide or universitywide water resources research institute or center. There would be authorized appropriation of an additional \$1 million, increasing to \$5 million in the fifth year, which the Secretary of the Interior would be authorized to use to match State or other non-Federal funds for specific water research projects at these institutes or centers.

Title II would authorize to be appropriated to the Secretary of the Interior \$5 million, increasing to \$10 million in the fifth year and annually thereafter, from which he would make grants or enter into contracts or make matching or other arrangements with educational institutions, private entities, or governmental agencies for research into water problems related to the Interior Department mission.

Title III of H.R. 2683, H.R. 2689, and H.R. 4048 would authorize the Secretary of the Interior to establish in the Department of the Interior a Water Resources Service for the purpose of administering programs authorized in the bills. The Senate, in passing S. 2, eliminated the pertinent sections providing for the establishment of a new agency within the Department of the Interior. Sections 301 of S. 2 and H.R. 2683, H.R. 2689, and H.R. 4048 state that nothing in the proposed legislation is intended nor shall be construed as giving the Secretary of the Interior any authority or surveillance over water

resources research conducted by any other agency of the Federal Government.

The Department of the Army believes that an expansion of State research in the water field, supplementing and complementing the water research of the Federal agencies, would be desirable. Moreover, it is believed that an increase in the grants which the Federal Government now makes to the States to encourage research would be justified by the benefits which would accrue to the Nation as a whole. Hence the basic objective of S. 2, H.R. 2683, H.R. 2689, and H.R. 4048 has the full support of the Department of the Army, on behalf of the Department of Defense.

In February 1963, the President, in transmitting to Congress the report of the Federal Council for Science and Technology's Task Group on Coordinated Water Resources Research, noted that the report represents an important step in the development of a program of coordinated water resources research recommended by the Senate Select Committee on National Water Resources. Based on the careful study of the task group on the need for legislation and other action to strengthen water resources research, the report concluded with several observations and recommendations that are pertinent to the legislation now being considered.

With respect to title II, the following statement from the Council's report is noted (pp. 211-212):

"If use is to be made of the full potential of the universities to support water resources research and graduate education in water-related fields, it is necessary that all Federal agencies engaged in such research have legislative authority and adequate funds to make grants and contracts for research at universities. Such grants are needed both at universities which are the sites of the multidisciplinary research centers referred to earlier, and at universities which may be centers of excellence in particular fields. Authority to make such grants exists in all the water research agencies except the Department of the Interior, although, as pointed out in chapter 6, special problems exist in the Departments of Agriculture and Commerce, that prevent them from giving full expression to their authorities. Also, it would be desirable to clarify, where necessary, the existing general authorities in this area held by other agencies having responsibilities in water resources research, such as the Corps of Engineers.

"It is the view of the task group that the Department of the Interior and the Corps of Engineers should be given explicit authority and the necessary funds to make grants to and contracts with educational institutions for the support of research related to their broad mission responsibilities in the field of water resources * * *."

The Department of the Army subscribes to this view, and recommends that title II be amended to provide explicit authority to undertake extramural research through various types of arrangements, including research grants, not only for the Department of the Interior, but also for the Department of the Army and for any other water resources agencies which do not now have such explicit authority.

The report concludes, with respect to the mission-oriented extramural grant programs referred to in the paragraph above (p. 212):

"The planning and administration of the extramural grant programs of the several departments should be coordinated through the proposed Coordinating Committee on Water Resources Research of the Federal Council for Science and Technology."

After discussing the desirability of establishing and supporting multidisciplinary water resources research centers in the universities, the report further concludes (p. 213):

"The administrative responsibility should be vested in one agency which should seek appropriations for this purpose, but the grants should be made in consultation with the other agencies having substantive interests in the field of water resources, which should participate in the drawing up of rules and regulations and criteria for evaluation. Such consultation and coordination as is necessary could be accomplished through the proposed Coordinating Committee on Water Resources Research."

The Department of the Army concurs in these conclusions, and recommends that the desirability of such arrangements for coordination of Federal support of multidisciplinary water resources research centers and of mission-oriented extramural research be recognized in those sections of the proposed legislation calling upon the Secretary of the Interior to coordinate with other agencies on programs relating to the purposes of this legislation.

This report has been coordinated within the Department of Defense in accordance with procedures prescribed by the Secretary of Defense.

The Bureau of the Budget advises that, from the standpoint of the administration's program, there is no objection to the presentation of this report for the consideration of the committee.

Sincerely yours,

CYRUS R. VANCE,
Secretary of the Army.

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE,
Washington, June 24, 1963.

Hon. WAYNE N. ASPINALL,
Chairman, Committee on Interior and Insular Affairs,
House of Representatives, Washington, D.C.

DEAR MR. CHAIRMAN: This letter is in response to your requests of May 21, 1963, for a report on H.R. 2683, H.R. 2689, H.R. 4048, and S. 2, as it passed the Senate, the proposed Water Resources Research Act.

We are wholly in sympathy with the bills' basic objective to promote a more adequate national program of water research. However, for the reasons summarized below, we question the need for title I of the bills, and we are not wholly in accord with the provisions of title III.

The provisions of title II of the bills—authorizing appropriations to the Department of the Interior to be used for grants, contracts, or matching of other arrangements for conducting research into aspects of water problems related to its mission (not defined in the bills)—are desirable and in accord with existing accepted methods for productive Federal research participation. They provide for the widest possible participation by scientists in research on water resources matters, permit all institutions, public and private, and all disciplines to participate, and can be administered to supply stable support for programs in universities and yet obtain flexibility in research approach. And they would give to the Secretary of the Interior research and research-support authority comparable to that which is vested in this

Department under the Water Pollution Control Act in order to promote good quality water adequate for all legitimate uses.

If title II is enacted and similar authorization is provided, as it should be, for all other Federal water resources agencies that now lack such authority, there is, in our opinion, little, if any, need for the proposed title I programs under which grants would be made by the Secretary of the Interior for the establishment and support of a water resources institute or center at a land-grant college or other State-designated educational institution in each State (including Puerto Rico). However, if title I is retained, some modifications are indicated. In the first place, the complete spectrum of water resources aspects specified as subjects for desirable research and investigations to be conducted by the proposed water research agencies is necessarily of basic interest to all Federal water resources agencies. We would therefore suggest participation by other Federal departments in the formulation of the rules and regulations necessary to carry out these provisions, with the Secretary of the Interior promulgating them. Secondly, we recommend deletion of the provision of section 104 that would require the Secretary of the Interior to encourage and assist in the establishment and maintenance of cooperation between the State research agencies and Federal establishments. We have encountered no difficulties in this regard in the administration of our research programs and, from the standpoint of this Department, do not perceive any need for an intermediary agent as proposed.

Section 100(a) of S. 2 contains a proviso, added on the floor of the Senate, which would authorize a State to designate for grants for establishing a water resources research institute, center, or equivalent agency, both a land-grant college "and" one or more other institutions of higher education, thus implying—and the remarks of the sponsor of the amendment confirm this implication—that one of the designated institutions must be a land-grant college. We believe that this is unnecessarily restrictive.

Finally, if the provision for a central water research and investigations catalog is retained in the bills (instead of leaving this matter to administrative discretion), we recommend that the function of establishing and maintaining such a coordinating device, on the basis of reports from Federal and other agencies and organizations, be vested in the Office of Science and Technology—which already has responsibilities for review and coordination of major Federal activities in scientific research—instead of deferring its transfer, as provided in the bills, to the time when, if ever, a central catalog is established for all scientific research.

If the bills are modified as above suggested, we would have no objection to their enactment.

The Bureau of the Budget advises that, while there is no objection to the submission of this report, the enactment of legislation along the lines of these bills would be in accord with the program of the President.

Sincerely,

ANTHONY J. CELEBREZZE, *Secretary.*

EXECUTIVE OFFICE OF THE PRESIDENT,
BUREAU OF THE BUDGET,
Washington, D.C., June 10, 1963.

HON. WAYNE N. ASPINALL,
*Chairman, Committee on Interior and Insular Affairs,
House of Representatives, Washington, D.C.*

DEAR MR. CHAIRMAN: This is in reply to your letter of May 21, 1963, requesting the comments of this office with respect to bills (H.R. 2683, H.R. 2689, H.R. 4048, and S. 2), to establish water resources research centers at land-grant colleges and State universities, to stimulate water research at other colleges, universities, and centers of competence, and to promote a more adequate national program of water research. The three House bills are identical with S. 2 except that the latter includes amendments adopted on the Senate floor prior to passage. Our comments are directed to the Senate-passed bill.

Under title I of the bill, funds would be authorized for distribution by the Secretary of the Interior to land-grant or other State designated institutions for the purpose of establishing water resources research institutes. Additional funds would also be authorized which the Secretary could use to match funds made available to the institutes by the States or by other sources.

Title II of the bill would authorize additional appropriations to the Secretary of the Interior from which he could make grants, contracts, or other arrangements with Government or private agencies and institutions. Title III contains certain miscellaneous provisions related to the administration of programs under the bill.

The provisions of S. 2 reflect a number of recommendations made by this office during its consideration in the Senate. While we concur in its objectives and the general approach outlined therein, we believe the bill is unnecessarily ambiguous as to the responsibility of the Secretary of the Interior for the administration of water resources research under title I. There is no explicit statement in the bill that the Secretary is to review research to assure its adequacy. To that end we would recommend that language such as the following be inserted as section 100(c) of the bill: "The Secretary shall approve proposals for and maintain a review of all research under this section to assure high standards of quality."

The need for clarifying the responsibility of the Secretary of the Interior for administering title I research has been intensified by Senate amendments of section 100(a) and 104 of the bill. An amendment of the latter section provides that the Secretary, in ascertaining the entitlement of States to section 100(a) funds, shall determine whether the requirements of section 101 have been met. That section deals only with fiscal accounting and auditing procedures to assure that funds have not been misapplied. The amendment could be interpreted to limit the authority of the Secretary to a mere fiscal auditing function in ascertaining the entitlement of States to section 100(a) funds. The Secretary could not be held responsible for proper administration of the program if his authority were so limited. We therefore urge that the language "this title" be substituted for "section 101" in section 104 of the bill and suggest that a comma be inserted after "State" to clarify the meaning of the provision.

In amending section 100(a) of the bill, the Senate inserted a proviso that a State may designate a land-grant institution and one or more

other institutions as water resource agencies under the section. Other provisions of the bill require that such agencies demonstrate their capability for doing effective work to the satisfaction of the Secretary of the Interior before being entitled to receive title I funds. We believe proliferation of State-designated water research agencies would be undesirable since it could complicate problems of coordination and reduce program effectiveness. For this reason the bill authorizes two or more States to designate a single interstate or regional research institute when appropriate. Following similar reasoning, it would appear appropriate to designate more than one agency within a State only when special circumstances exist.

Strengthening of university water research activities through a program firmly administered by the Secretary of the Interior would constitute a major step toward meeting goals set forth by the President in the water resources area. Accordingly, enactment of legislation along these lines would be in accord with the President's program.

Sincerely yours,

PHILLIP S. HUGHES,
Assistant Director for Legislative Reference.

EXECUTIVE OFFICE OF THE PRESIDENT,
OFFICE OF SCIENCE AND TECHNOLOGY,
Washington, June 10, 1963.

HON. WAYNE N. ASPINALL,
*Chairman, Committee on Interior and Insular Affairs,
House of Representatives, Washington, D.C.*

DEAR CONGRESSMAN: I am pleased to respond to your request for my comments on H.R. 2683, H.R. 2689, H.R. 4048, and S. 2.

During the last Congress, I commented extensively by letter of December 21, 1962, to Senator Anderson on the predecessor to these bills, S. 3579. I am pleased to note that many of the points raised in that letter have received favorable consideration in the language of the four bills currently pending before your committee. In that communication, I endorsed the objectives of the earlier bill in these terms:

"Legislation along the general lines of the bill could serve a useful purpose in providing additional authority and funds for a concerted approach to the problems in the field of water resources research. To carry out the additional research in water resources needed to assure an abundance of water of adequate quality requires augmentation of research in the universities to utilize more effectively their research potential, to bring to bear the several interrelated disciplines bearing on water resources, and to train the new scientists and engineers sorely needed for research and teaching in this field."

By subsequent letter to Senator Anderson of February 1, 1963, I made the following comment on S. 2 while that bill was pending before the Senate Committee on Interior and Insular Affairs.

"Based on our studies of the Federal programs and activities in water resources research, I am confident that S. 2 can contribute significantly to the strengthening of the capabilities of the colleges and universities to undertake broadly based research and analysis in the many disciplines bearing on water resources. I wish to reiterate, however, that the Government should adhere to high standards of

quality in the administration of the program envisaged in S. 2. It would seem desirable to have specific language in the bill to this effect in order to make it clear to both the Government and the universities that this is the intent of the Congress."

These continue to be my views on S. 2, as that bill recently passed the Senate. In this connection, I would like to associate myself with the views of the Bureau of the Budget, expressed to you by letter today on the need to emphasize the responsibility of the Secretary of the Interior to assure that research under this legislation meets high standards of quality.

In the event that the clarifications suggested by the Bureau are not adopted, I hope that language would be present in the House proceedings to indicate the intent of Congress that the Secretary be clearly responsible for achieving research quality.

It is my belief that the effectiveness of this legislation in expanding scientific understanding in ways that can assure the sound development of the Nation's water resources will depend in no small part on the ability of the Secretary of the Interior to guide the standards of performance of research centers that receive Federal support.

Sincerely yours,

JEROME B. WIESNER.

COMPTROLLER GENERAL OF THE UNITED STATES,
Washington, May 2, 1963.

B-149711.

Hon. WAYNE N. ASPINALL,
Chairman, Committee on Interior and Insular Affairs,
House of Representatives.

DEAR MR. CHAIRMAN: The bill S. 2, passed by the Senate on April 23, 1963, and referred to your committee on April 24, and companion bills H.R. 2683 and H.R. 2689, propose the establishment of water resources institutes at land-grant colleges and State universities and would promote a more adequate national program of water research. There are two matters which we would like to bring to your attention in connection with these bills. Substantial financial assistance would be provided by the Government on a continuing basis under the proposed program yet no provision is made concerning records and audits. As a protection against waste or improper use of Federal funds which go into the program, we suggest that a section be added requiring recipients of assistance to keep records which will enable audits to be made by representatives of the Secretary of the Interior and the General Accounting Office. Similar authority relating to loans and grants is contained in section 25 of the Area Redevelopment Act, approved May 1, 1961, Public Law 87-27, 75 Stat. 63, section 908 of the Housing Act of 1961, approved June 30, 1961, Public Law 87-70, 75 Stat. 191, and in other proposed legislation for grant programs. The following language to accomplish this is suggested for your consideration:

SEC . (a) Each recipient of assistance under section 100 or 200 of this act shall keep such records as the Secretary of the Interior shall prescribe, including records which fully disclose the amount and the disposition by such recipient of the proceeds of such assistance, the total cost of the project or undertaking in connection with which such

assistance is given or used, and the amount and nature of that portion of the cost of the project or undertaking supplied by other sources, and such other records as will facilitate an effective audit.

(b) The Secretary of the Interior, and the Comptroller General of the United States, or any of their duly authorized representatives, shall have access for the purpose of audit and examination to any books, documents, papers, and records of the recipient that are pertinent to assistance received under section 100 or 200 of this act.

The second matter which we would like to bring to your attention relates to section 303 of the proposed legislation as introduced. This section, which was deleted from S. 2 by the Senate, would authorize the use of not to exceed 4 percent of any funds appropriated pursuant to the act for purposes of administration. Financing administration by this method is a departure from the usual method of funding administrative expenses, and it is not, in our opinion, conducive to adequate congressional control or to economical administration. It is therefore suggested that if either H.R. 2683 or H.R. 2689 is considered favorably, the first sentence of section 303 be changed in favor of language authorizing annual appropriations for administration. Such change would insure the benefit of the usual budgetary and appropriation procedures.

Sincerely yours,

JOSEPH CAMPBELL,
Comptroller General of the United States.

COMMITTEE RECOMMENDATION

The Committee on Interior and Insular Affairs recommends the enactment of S. 2, as amended.

○

S. 2

[Report No. 1136]

IN THE HOUSE OF REPRESENTATIVES

APRIL 24, 1963

Referred to the Committee on Interior and Insular Affairs

FEBRUARY 10, 1964

Reported with amendments, committed to the Committee of the Whole House
on the State of the Union, and ordered to be printed

[Strike out all after the enacting clause and insert the part printed in italic]

AN ACT

To establish water resources research centers at land-grant colleges and State universities, to stimulate water research at other colleges, universities, and centers of competence, and to promote a more adequate national program of water research.

1 *Be it enacted by the Senate and House of Representa-*
2 *tives of the United States of America in Congress assembled,*
3 ~~That it is the policy and purpose of the Congress to assure~~
4 ~~the Nation at all times an abundance of water, both as to~~
5 ~~quantities and quality, necessary to meet the requirements~~
6 ~~of its expanding population, and, to help achieve this objec-~~
7 ~~tive, to stimulate, sponsor, and provide for the conduct of~~
8 ~~research, investigations, and experiments in the field of water~~

1 and related resources as they affect water, supplementing
2 present programs, and to encourage the training of scientists
3 in fields related to water by assistance to colleges and univer-
4 sities in the development of water resources research
5 programs.

6 TITLE I—STATE WATER RESOURCES RESEARCH
7 INSTITUTES OR CENTERS

8 SEC. 100. (a) There is authorized to be appropriated,
9 for the fiscal year 1964 and subsequent years, for distribu-
10 tion to a college or university in each State and Puerto Rico,
11 established in accordance with an Act approved July 2,
12 1862 (12 Stat. 503), entitled "An Act donating public
13 lands to the several States and territories which may provide
14 colleges for the benefit of agriculture and the mechanic arts",
15 or such other institutions of higher education as any State
16 shall determine, a sum adequate to provide \$75,000 to each
17 State in the first year, to be increased by \$12,500 each
18 succeeding fiscal year for two years and to continue at
19 \$100,000 thereafter, for the purpose of establishing a college-
20 wide or universitywide water resources research institute,
21 center, or equivalent agency: *Provided*, That a State may
22 designate both a college (or university) established in ac-
23 cordance with said Act approved July 2, 1862 (12 Stat.
24 503), and one or more other institutions of higher education
25 for this purpose. It shall be the duty of each such institute

1 or center to plan and conduct and/or arrange for a compo-
2 nent or components of its college or university to conduct
3 competent researches, investigations, or experiments, of either
4 a basic or practical nature, or both, in relation to water
5 resources, including but not limited to aspects of the hydro-
6 logical cycle, supply and demand for water, conservation and
7 best use of available supplies, methods of increasing such
8 supplies, economic, legal, social, engineering, recreation, bio-
9 logical, geographic, ecological, and other aspects of water
10 problems, as may in each case be deemed advisable, having
11 due regard to the varying conditions and needs of the re-
12 spective States and Puerto Rico, to water research projects
13 being conducted by agencies of the Federal Government,
14 and to those related to agriculture being conducted by the
15 agricultural experiment stations, and also having regard to
16 avoidance of any undue displacement of scientists and engi-
17 neers elsewhere engaged in water resources research.

18 (b) There is further authorized to be appropriated to
19 the Secretary of the Interior in the fiscal year 1964 the sum
20 of \$1,000,000, increasing by \$1,000,000 each year for four
21 years to \$5,000,000 in fiscal year 1968 and thereafter, which
22 the Secretary of the Interior may use to match, on a dollar
23 for dollar basis, funds made available to State water re-
24 sources research institutes or centers by the States or other
25 non-Federal sources, to meet the necessary expenses of water

1 resources research projects which could not otherwise be
2 undertaken, including the expense of planning and coordinat-
3 ing regional water resources research projects by two or
4 more State water research agencies.

5 SEC. 101. Sums available to the States under the terms
6 of section 100(a) of this Act shall be paid to the designated
7 institution or institutions in each State in equal quarterly
8 payments beginning on the first day of July of each fiscal
9 year upon vouchers approved by the Secretary of the
10 Interior. Each such agency authorized to receive funds
11 shall have an officer appointed by its governing authority
12 who shall receive and account for all funds paid to the State
13 under the provisions of this Act and shall make an annual
14 report to the Secretary of the Interior, on or before the first
15 day of September of each year, on work accomplished and
16 the status of projects underway together with a detailed
17 statement of the amount received under any of the provisions
18 of this Act during the preceding fiscal year, and of its dis-
19 bursement, on schedules prescribed by the Secretary of the
20 Interior. If any of the moneys received by the authorized
21 receiving officer of any State water resources research agency
22 under the provisions of this Act shall by any action or con-
23 tingency be found by the Secretary of the Interior to have
24 been improperly diminished, lost, or misapplied, it shall be
25 replaced by the State concerned and until so replaced no

1 subsequent appropriation shall be allotted or paid to such
2 States. Pending a meeting of the legislature of any State,
3 the Secretary of the Interior shall pay sums appropriated
4 pursuant to section 100 of this Act to a qualified institution
5 designated by the Governor of such State.

6 SEC. 102. Moneys appropriated pursuant to this Act
7 shall also be available, in addition to meeting expenses for
8 research and investigations conducted under authority of this
9 Act, for printing and disseminating the results of such re-
10 search, retirement of employees subject to the applicable pro-
11 visions of the Act approved March 4, 1940 (54 Stat. 39),
12 administrative planning and direction, and for the purchase
13 and rental of land and the construction, acquisition, altera-
14 tion, or repair of buildings necessary for conducting research,
15 The State water resources research agencies are authorized
16 to plan and conduct any research authorized under this Act
17 in cooperation with each other and such other agencies and
18 individuals as may contribute to the solution of the water
19 problems involved, and moneys appropriated pursuant to this
20 Act shall be available for paying the necessary expenses of
21 planning, coordinating, and conducting such cooperative re-
22 search. Two or more States may cooperate in the designa-
23 tion of a single interstate or regional research institute or
24 center.

25 SEC. 103. (a) Paragraph (1) of section 4152(a) of

1 title 39, United States Code, is amended by striking the
2 word "and" at the end of subparagraph (E) and by adding
3 the following at the end of subparagraph (F): "and

4 "~~(G)~~ Any institute or center engaged in activities au-
5 thorized by the Water Resources Research Act consisting of
6 bulletins, reports, periodicals, reprints of articles, and other
7 publications necessary for the dissemination of results of re-
8 searches and experiments within the scope of the Act, as
9 determined by the Secretary of the Interior, mailed from the
10 principal place of business of the institute or center, or from
11 an established subunit of the same."

12 ~~(b)~~ Section 4156 of title 39, United States Code, is
13 amended by adding a new subsection ~~(d)~~ as follows:

14 "~~(d)~~ The Department of Interior shall transfer to the
15 Post Office Department as postal revenue out of any appro-
16 priation made to it for that purpose the equivalent amount of
17 postage, as determined by the Postmaster General, for
18 penalty mailings under section 4152(a)-(1)-~~(G)~~ of this
19 title."

20 SEC. 104. The Secretary of the Interior is hereby
21 charged with the responsibility for the proper administra-
22 tion of this Act, and, after full consultation with other Fed-
23 eral agencies, is authorized and directed to prescribe such
24 rules and regulations as may be necessary to carry out its
25 provisions, including requirement of a showing that agencies

1 designated to receive funds have, or may reasonably be
2 expected to have, the capability of doing effective work. It
3 shall be the duty of the Secretary to furnish such advice and
4 assistance as will best promote the purposes of this Act,
5 including participation in coordination of research initiated
6 under this Act by the State water resources research agen-
7 cies, from time to time, to indicate such lines of inquiry as
8 to him seem most important, and to encourage and assist
9 in the establishment and maintenance of cooperation by and
10 between the several States water resources research agencies
11 and between the State agencies and the United States
12 Department of the Interior and other Federal establishments.

13 On or before the 1st day of July in each year after the
14 passage of this Act, the Secretary of the Interior shall ascer-
15 tain whether the requirements of section 104 have been
16 met as to each State whether it is entitled to receive its share
17 of the annual appropriations for water resources research
18 under section 100(a) of this Act and the amount which
19 thereupon each is entitled, respectively, to receive.

20 The Secretary of the Interior shall make an annual
21 report to the Congress of the receipts and expenditures and
22 work of the water resources research agencies in all States
23 under the provisions of this Act and also whether any portion
24 of the appropriation available for allotment to any State has
25 been withheld and if so the reasons therefor.

1 SEC. 105. Nothing in this Act shall be construed to im-
2 pair or modify the legal relation existing between any of
3 the colleges or universities under whose direction State water
4 resources research institutes or centers are established and
5 the government of the States in which they are respectively
6 located: *Provided*, That in any State which designates more
7 than one such college or university to have a water resources
8 research center the appropriations made pursuant to section
9 100(a) of this Act for such State shall be divided between
10 such institutions as the legislature of such State shall direct:
11 *Provided further*, That in any instance where two or more
12 States designate a single interstate or regional institute or
13 Center, the funds of each of the States under section 100(a)
14 may, upon the direction of the States, be paid to the desig-
15 nated agency.

16 ~~TITLE II—ADDITIONAL WATER RESOURCES~~
17 ~~RESEARCH PROGRAMS~~

18 SEC. 200. There is authorized to be appropriated to the
19 Secretary of the Interior \$5,000,000 in fiscal year 1964,
20 increasing \$1,000,000, annually for five years, and continu-
21 ing at \$10,000,000 annually thereafter from which he may
22 make grants, contracts, matching, or other arrangements
23 with educational institutions, private foundations, or other
24 institutions; with private firms and individuals; and with
25 local, State, or Federal Government agencies, to undertake

1 research into any aspects of water problems related to the
2 mission of the Department of the Interior, which may be
3 deemed desirable and are not otherwise being studied.

4 TITLE III—MISCELLANEOUS PROVISIONS

5 SEC. 300. The Secretary of the Interior shall arrange
6 for the regular advice and cooperation of all agencies of the
7 Federal Government concerned with water problems, of State
8 and local governments and of private institutions and
9 individuals, to assure that the programs authorized in this
10 Act will supplement and not duplicate established water
11 research programs, to stimulate research in otherwise ne-
12 glected areas, and to contribute to a comprehensive, nation-
13 wide program of water and related resources research. He
14 shall make generally available information and reports on
15 projects completed, in progress, or planned under the pro-
16 visions of this Act, in addition to any direct dissemination
17 of information by the research agencies themselves. Each
18 Federal agency doing water resources research or inves-
19 tigation shall advise the Secretary of the Interior at least
20 once annually of work underway or scheduled by it. The
21 Secretary of the Interior shall classify and maintain for
22 general use a catalog of water resources research and in-
23 vestigation projects in progress or scheduled by Federal
24 agencies, and by such non-Federal agencies of government;

1 colleges, universities, private institutions, firms and in-
2 dividuals as may make voluntarily available information to
3 him: *Provided*, That upon the establishment of a central
4 or general system of cataloging current and projected scien-
5 tific research in all fields encompassing the cataloging func-
6 tion herein authorized, the President may transfer this
7 function as he determines to be desirable.

8 SEC. 301. Nothing in the foregoing section nor in this
9 Act is intended nor shall be construed as giving its Secretary
10 or the Department of the Interior any authority or surveil-
11 lance over water resources research conducted by any other
12 agency of the Federal Government, nor shall it be construed
13 as repealing, superseding, or diminishing existing authorities
14 or responsibilities of any agency of the Federal Government
15 to plan and conduct, contract for, or assist in research in its
16 areas of responsibility and concern with water resources.

17 SEC. 302. Contracts or other arrangements for water
18 resources research work authorized under this Act with an
19 educational institution or non-profit organization may be
20 undertaken without regard to the provisions of section 3684
21 of the Revised Statutes (31 U.S.C. 529) when in the
22 judgment of the Secretary of the Interior advance payments
23 of initial expense are necessary to facilitate such research.

24 SEC. 303. Within two years following enactment of this
25 Act, and annually thereafter, the Secretary of the Interior

1 shall prepare and submit to the President for transmittal to
2 the Senate and House of Representatives a comprehensive
3 report on progress and accomplishments under the Act,
4 together with his recommendations on revisions of the Act,
5 and with the independent recommendations of the governing
6 authorities of the State colleges and universities on desirable
7 revisions.

8 SEC. 304. No part of any appropriated funds may be
9 expended pursuant to authorization given by this Act for
10 any scientific or technological research or development
11 activity unless such expenditure is conditioned upon pro-
12 visions determined by the Secretary of the Interior, with
13 the approval of the Attorney General, to be effective to
14 insure that all information, uses, products, processes, patents,
15 and other developments resulting from that activity will
16 (with such exceptions and limitations as the Secretary may
17 determine after consultation with the Secretary of Defense
18 to be necessary in the interest of the national defense) be
19 made freely and fully available to the general public.
20 Nothing contained in this subsection shall deprive the owner
21 of any background patent relating to any such activity of
22 any right which that owner may have under that patent.

23 SEC. 305. This Act may be known as the "Water Re-
24 sources Research Act."

1 *That (a) this Act may be cited as the "Water Resources*
2 *Research Act of 1964."*

3 *(b) In order to assist in assuring the Nation at all times*
4 *of a supply of water sufficient in quantity and quality to*
5 *meet the requirements of its expanding population, it is the*
6 *purpose of the Congress, by this Act, to stimulate, sponsor,*
7 *provide for, and supplement present programs for the con-*
8 *duct of research, investigations, experiments, and the training*
9 *of scientists in the fields of water and of resources which*
10 *affect water.*

11 *TITLE I—STATE WATER RESOURCES*

12 *RESEARCH INSTITUTES*

13 *SEC. 100. (a) There are authorized to be appropriated*
14 *to the Secretary of the Interior for the fiscal year 1965 and*
15 *for each of the nine fiscal years subsequent thereto sums*
16 *adequate to provide \$75,000 to each of the several States*
17 *in the first year, \$87,500 in each of the second and third*
18 *years, and \$100,000 each year thereafter to assist each*
19 *participating State in establishing and carrying on the work*
20 *of a competent and qualified water resources research in-*
21 *stitute, center, or equivalent agency (hereinafter referred*
22 *to as "institute") at one college or university in that State,*
23 *which college or university shall, unless otherwise provided*
24 *by act of the legislature of the State concerned, be a college*
25 *or university established in accordance with the Act ap-*

1 proved July 2, 1862 (12 Stat. 503), entitled "An Act
 2 donating public lands to the several States and territories
 3 which may provide colleges for the benefit of agriculture and
 4 the mechanic arts": Provided, That (1) if there is more
 5 than one such college or university in a State, established
 6 in accordance with said Act of July 2, 1862, funds under
 7 this Act shall, in the absence of a designation to the contrary
 8 by act of the legislature of the State, be paid to the one such
 9 college or university designated by the Governor of the State
 10 to receive the same subject to the Secretary's determination
 11 that such college or university has, or may reasonably be ex-
 12 pected to have, the capability of doing effective work under
 13 this Act; (2) two or more States may cooperate in the desig-
 14 nation of a single interstate or regional institute, in which
 15 event the sums assignable to all of the cooperating States
 16 shall be paid to such institute; and (3) a designated college
 17 or university may, as authorized by appropriate State au-
 18 thority, arrange with other colleges and universities within
 19 the State to participate in the work of the institute.

20 (b) It shall be the duty of each such institute to plan and
 21 conduct and/or arrange for a component or components of
 22 the college or university with which it is affiliated to conduct
 23 competent research, investigations, and experiments of either
 24 a basic or practical nature, or both, in relation to water

1 resources and to provide for the training of scientists through
2 such research, investigations, and experiments. Such research,
3 investigations, experiments, and training may include, without
4 being limited to, aspects of the hydrologic cycle; supply and
5 demand for water; conservation and best use of available
6 supplies of water; methods of increasing such supplies; and
7 economic, legal, social, engineering, recreational, biological,
8 geographic, ecological, and other aspects of water problems,
9 having due regard to the varying conditions and needs of the
10 respective States, to water research projects being conducted by
11 agencies of the Federal and State Governments, the agricul-
12 tural experiment stations, and others, and to avoidance of any
13 undue displacement of scientists and engineers elsewhere
14 engaged in water resources research.

15 SEC. 101. (a) There is further authorized to be appropri-
16 ated to the Secretary of the Interior for the fiscal year 1965
17 and for the nine fiscal years thereafter sums not in excess of
18 the following: 1965, \$1,000,000; 1966, \$2,000,000; 1967,
19 \$3,000,000; 1968, \$4,000,000; and 1969 and each of the
20 five succeeding years, \$5,000,000. Such moneys when ap-
21 propriated, shall be available to match, on a dollar-for-dollar
22 basis, funds made available to institutes by States or other non-
23 Federal sources to meet the necessary expenses of specific water
24 resources research projects which could not otherwise be
25 undertaken, including the expenses of planning and coordi-

1 nating regional water resources research projects by two or
2 more institutes.

3 (b) Each application for a grant pursuant to subsection
4 (a) of this section shall, among other things, state the nature
5 of the project to be undertaken, the period during which it
6 will be pursued, the qualifications of the personnel who will
7 direct and conduct it, the importance of the project to the
8 water economy of the Nation, the region, and the State con-
9 cerned, its relation to other known research projects thereto-
10 fore pursued or currently being pursued, and the extent to
11 which it will provide opportunity for the training of water
12 resources scientists. No grant shall be made under said sub-
13 section (a) except for a project approved by the Secretary,
14 and all grants shall be made upon the basis of the merit of the
15 project, the need for the knowledge which it is expected to
16 produce when completed, and the opportunity it provides for
17 the training of water resources scientists.

18 SEC. 102. Sums available to the States under the terms of
19 sections 100 and 101 of this Act shall be paid to their desig-
20 nated institutes in equal quarterly payments beginning on the
21 1st day of July of each fiscal year upon vouchers approved
22 by the Secretary. Each institute shall have an officer ap-
23 pointed by its governing authority who shall receive and
24 account for all funds paid under the provisions of this Act
25 and shall make an annual report to the Secretary on or before

1 the 1st day of September of each year, on work accomplished
2 and the status of projects underway, together with a detailed
3 statement of the amounts received under any of the provisions
4 of this Act during the preceding fiscal year, and of its dis-
5 bursement, on schedules prescribed by the Secretary. If any
6 of the moneys received by the authorized receiving officer of
7 any institute under the provisions of this Act shall by any
8 action or contingency be found by the Secretary to have been
9 improperly diminished, lost, or misapplied, it shall be re-
10 placed by the State concerned and until so replaced no sub-
11 sequent appropriation shall be allotted or paid to any
12 institute of such State.

13 SEC. 103. Moneys appropriated pursuant to this Act,
14 in addition to being available for expenses for research, in-
15 vestigations, experiments, and training conducted under
16 authority of this Act, shall also be available for printing and
17 publishing the results thereof and for administrative planning
18 and direction. The institutes are hereby authorized and en-
19 couraged to plan and conduct programs financed under this
20 Act in cooperation with each other and with such other
21 agencies and individuals as may contribute to the solution of
22 the water problems involved, and moneys appropriated pur-
23 suant to this Act shall be available for paying the necessary
24 expenses of planning, coordinating, and conducting such
25 cooperative research.

1 *SEC. 104. The Secretary of the Interior is hereby*
2 *charged with the responsibility for the proper administration*
3 *of this Act and, after full consultation with other interested*
4 *Federal agencies, shall prescribe such rules and regulations*
5 *as may be necessary to carry out its provisions. He shall*
6 *require a showing that institutes designated to receive funds*
7 *have, or may reasonably be expected to have, the capability of*
8 *doing effective work. He shall furnish such advice and assist-*
9 *ance as will best promote the purposes of this Act, participate*
10 *in coordinating research initiated under this Act by the*
11 *institutes, indicate to them such lines of inquiry as to him*
12 *seem most important, and encourage and assist in the estab-*
13 *lishment and maintenance of cooperation by and between the*
14 *institutes and between them and other research organizations,*
15 *the United States Department of the Interior, and other*
16 *Federal establishments.*

17 *On or before the 1st day of July in each year after the*
18 *passage of this Act, the Secretary shall ascertain whether the*
19 *requirements of section 102 have been met as to each State,*
20 *whether it is entitled to receive its share of the annual appro-*
21 *priations for water resources research under section 100 of*
22 *this Act, and the amount which it is entitled to receive.*

23 *The Secretary shall make an annual report to the Con-*
24 *gress of the receipts and expenditures and work of the insti-*
25 *tutes in all States under the provisions of this Act. His*

1 report shall indicate whether any portion of an appropriation
2 available for allotment to any State has been withheld and,
3 if so, the reasons therefor.

4 SEC. 105. Nothing in this Act shall be construed to
5 impair or modify the legal relation existing between any of
6 the colleges or universities under whose direction an institute
7 is established and the government of the State in which it is
8 located, and nothing in this Act shall in any way be construed
9 to authorize Federal control or direction of education at any
10 college or university.

11 TITLE II—MISCELLANEOUS PROVISIONS

12 SEC. 200. The Secretary of the Interior shall obtain the
13 continuing advice and cooperation of all agencies of the Fed-
14 eral Government concerned with water problems, of State and
15 local governments, and of private institutions and individuals,
16 to assure that the programs authorized in this Act will
17 supplement and not duplicate established water research pro-
18 grams, to stimulate research in otherwise neglected areas, and
19 to contribute to a comprehensive, nationwide program of
20 water and related resources research. He shall make gener-
21 ally available information and reports on projects completed,
22 in progress, or planned under the provisions of this Act, in
23 addition to any direct publication of information by the
24 institutes themselves.

25 SEC. 201. Nothing in this Act is intended to give or shall

1 be construed as giving the Secretary of the Interior any
2 authority or surveillance over water resources research con-
3 ducted by any other agency of the Federal Government, or as
4 repealing, superseding, or diminishing existing authorities
5 or responsibilities of any agency of the Federal Government
6 to plan and conduct, contract for, or assist in research in its
7 areas of responsibility and concern with water resources.

8 *SEC. 202. Contracts or other arrangements for water*
9 *resources work authorized under this Act with an institute*
10 *may be undertaken without regard to the provisions of section*
11 *3684 of the Revised Statutes (31 U.S.C. 529) when, in the*
12 *judgment of the Secretary of the Interior, advance payments*
13 *of initial expense are necessary to facilitate such work.*

14 *SEC. 203. No part of any appropriated funds may be*
15 *expended pursuant to authorization given by this Act for any*
16 *scientific or technological research or development activity*
17 *unless such expenditure is conditioned upon provisions de-*
18 *termined by the Secretary of the Interior, with the approval*
19 *of the Attorney General, to be effective to insure that all*
20 *information, uses, products, processes, patents, and other de-*
21 *velopments resulting from that activity will (with such ex-*
22 *ceptions and limitations as the Secretary may determine,*
23 *after consultation with the Secretary of Defense, to be neces-*
24 *sary in the interest of the national defense) be made freely*
25 *and fully available to the general public. Nothing contained*

1 in this subsection shall deprive the owner of any background
2 patent relating to any such activity of any rights which that
3 owner may have under that patent.

4 SEC. 204. There shall be established, in such agency
5 and location as the President determines to be desirable, a
6 center for cataloging current and projected scientific research
7 in all fields of water resources. Each Federal agency doing
8 water resources research shall cooperate by providing the
9 cataloging center with information on work underway or
10 scheduled by it. The cataloging center shall classify and
11 maintain for general use a catalog of water resources research
12 and investigation projects in progress or scheduled by all
13 Federal agencies and by such non-Federal agencies of gov-
14 ernment, colleges, universities, private institutions, firms, and
15 individuals as voluntarily may make such information
16 available.

17 SEC. 205. The President shall, by such means as he
18 deems appropriate, clarify agency responsibilities for Federal
19 water resources research and provide for interagency coordi-
20 nation of such research, including the research authorized by
21 this Act. Such coordination shall include (a) continuing
22 review of the adequacy of the Government-wide program in
23 water resources research, (b) identification and elimination of
24 duplication and overlaps between two or more agency pro-
25 grams, (c) identification of technical needs in various water

AN ACT

To establish water resources research centers at land-grant colleges and State universities, to stimulate water research at other colleges, universities, and centers of competence, and to promote a more adequate national program of water research.

APRIL 24, 1963

Referred to the Committee on Interior and Insular Affairs

FEBRUARY 10, 1964

Reported with amendments, committed to the Committee of the Whole House on the State of the Union, and ordered to be printed

Feb. 25, 64

HOUSE

15. WATER RESEARCH. The Rules Committee denied a rule on S. 2, to establish water resource research centers at the land-grant colleges and State universities and promote a more adequate national program of water research. p. D135
16. LANDS; LAW. The Rules Committee voted to report a resolution for the consideration of H. R. 8070, to establish a Public Land Law Review Commission to study existing laws and procedures relating to the administration of the public lands of the U.S. p. D135
17. BEEF IMPORTS. Rep. Langen voiced disapproval of the recently concluded agreement with Australia and New Zealand to voluntarily limit beef imports to the U.S. and charged that the agreement is setting a "dangerous precedent that could extend to other industries as well as agriculture." p. 3477
18. ELECTRIFICATION. Rep. King (N.Y.) urged that further expansion of REA be controlled by increasing the interest rate on their loans to cooperatives. pp. 3492-3
19. FOREIGN TRADE. Rep. Rooney (Pa.) inserted a statement urging the "elimination of inequities" in export and import rates through the reduction of foreign trade barriers. pp. 3486-91
20. TAXATION. By a vote of 326 to 83, agreed to the Conference report on H. R. 8363, the tax bill. See Digest 32 for items of interest. pp. 3424-51
21. ELECTRIFICATION. Both Houses received from the Federal Power Commission their annual report for the fiscal year 1963. pp. 3495-3310
Both Houses received from the Comptroller General an audit report of financial statements of TVA for fiscal year 1963 (H. Doc. 234). pp. 3495, 3310
22. TARIFFS. Received the annual report of the U.S. Tariff Commission. p. 3495
23. LANDS. The Public Lands Subcommittee of the Interior and Insular Affairs Committee voted to report to the full committee with amendments the following bills: H. R. 5159, to authorize and direct that certain lands exclusively administered by Interior be managed under principles of multiple use and to produce a sustained yield of products and services; H. R. 5498, to promote the sale and beneficial use of certain public lands; and H. R. 8305, to provide that until June 30, 1968, Congress shall be notified of certain proposed public land actions, including withdrawals, reservations, etc., of national forest lands of 5,000 acres or more. p. D134
24. PEACE CORPS. The Rules Committee voted to report a resolution for consideration of H. R. 9666, to increase the authorization for the operation of the Peace Corps for fiscal year 1965 to \$115 million. p. D134

ITEMS IN APPENDIX

25. FARM LABOR. Extension of remarks of Rep. Leggett inserting a news release by John V. Newman, Calif. State Board of Agriculture, stating that the growers this year will not seek an extension of the Mexican farm labor program, but will look forward to "complete utilization of our domestic labor supply." pp. A882-3

26. POVERTY. Extension of remarks of Rep. Sickles inserting an article commending the President for his program to aid the poverty-stricken Appalachian region. pp. A883-4
27. AREA REDEVELOPMENT. Extension of remarks of Rep. White stating that he had an opportunity to see at firsthand the progress of a series of projects of the Area Redevelopment Admin. pp. A892-3
28. UNEMPLOYMENT; POVERTY. Extension of remarks of Rep. Finnegan commending and inserting John Cullerton's Ill. Dept. of Labor, article as "an approach" to the unemployment problem, that it deserves circulation and is of particular significance "in light of the administration's current war on poverty." pp. A893-4
29. SOVIET AGRICULTURE. Extension of remarks of Rep. Ellsworth inserting a Wall Street Journal article analyzing Russian agriculture failures. pp. A903-4

BILLS INTRODUCED

30. PATENTS. S. 2547, by Sen. Dodd, to fix certain fees payable to the Commissioner of Patents; to Judiciary Committee. Remarks of author, pp. 3311-2
31. PERSONNEL. S. 2549, by Sen. Randolph, to amend the Federal Employees' Compensation Act so as to permit injured employees entitled to receive medical services under such act to utilize the services of optometrists; to Labor and Public Welfare Committee.
32. MEAT IMPORTS. H. R. 10082, by Rep. Olsen, Mont., H. R. 10083, by Rep. Johnson, Calif., H. R. 10084, by Rep. Harding, H. R. 10095, by Rep. Montoya, and H. R. 10097, by Rep. Fisher, to restrict the imports of beef, veal, and mutton into the United States; to Ways and Means Committee. Remarks of Rep. Olsen, p. 3471, Rep. Harding, pp. 3420-1, Rep. Montoya, p. 3483, and Rep. Fisher, pp. A905-6.
H. R. 10085, by Rep. Martin, Nebr., to restrict the imports of certain meats into the United States during a 3-year period; to Ways and Means Committee.
H. R. 10099, by Rep. Jensen, to restrict imports of meat and meat products into the United States; to Ways and Means Committee. Remarks of author p. A894.
33. FISHERIES. H. R. 10087, by Rep. Cederberg, to authorize the Secretary of the Interior to make payments to reestablish the purchasing power of American fishermen suffering temporary economic dislocation; to Merchant Marine and Fisheries Committee.
34. HEALTH. H. R. 10088, by Rep. Fogarty, to provide assistance in the development of new or improved programs to help older persons through grants to the States for community planning and services and for training, through research, development, or training project grants, and to establish within the Department of Health, Education, and Welfare an operating agency to be designated as the "Administration on Aging"; to Education and Labor Committee.
35. WEIGHTS AND MEASURES. H. R. 10089, by Rep. McClory, to provide that the National Bureau of Standards shall conduct a program of investigation, research, and survey to determine the practicability of the adoption by the United States of the metric system of weights and measures; to Science and Astronautics Committee.

Digest of CONGRESSIONAL PROCEEDINGS

OF INTEREST TO THE DEPARTMENT OF AGRICULTURE

OFFICE OF
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(For information only;
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or cited)

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For actions of May 5, 1964

88th-2nd; No. 89

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HIGHLIGHTS: House Rules Committee cleared water resources research centers bill. Sen. Gruening urged extension of public works acceleration program. Sen. Javits inserted Chamber of Commerce policy statement on East-West trade. Sen. Javits supported reduction of tariffs on agricultural products in GATT negotiations.

SENATE

1. CIVIL RIGHTS. Continued debate on H. R. 7152, the civil rights bill (pp. 9764-7, 9768-75, 9776-95, 9797-8, 9799-9800). Sen. Cooper inserted a letter from Attorney General Kennedy interpreting provisions of the bill, including their application to certain farm programs (pp. 9763-4).
2. PUBLIC WORKS. Sen. Gruening urged extension and expansion of the public works acceleration program and commended the President's statement that "the Federal Government would step up its programs of public works" if private enterprise failed to bring about full employment. pp. 9775-6
3. FOREIGN TRADE. Sen. Javits suggested "a full scale review of U. S. policies dealing with Soviet bloc trade in nonstrategic goods," and inserted the policy statement of the Chamber of Commerce on East-West trade and several other items in support of his position. pp. 9744-52
Sen. Javits reviewed the importance of the GATT trade negotiations, suggested several objectives that U. S. negotiators should seek to obtain in the negotia-

tions, including a reduction of tariffs on industrial and agricultural products and a code of trade practices to govern the trade of GATT nations with the Soviet bloc's State trading enterprises, and inserted several articles discussing the negotiations. pp. 9752-4

Sen. Javits compared antidumping regulations of the U. S. and Canada and inserted a Chamber of Commerce policy declaration favoring the establishment of uniform antidumping laws and regulations among trading nations. pp. 9754-5

4. TOBACCO. Sen. Jordan commended the action of cigarette companies in setting up a voluntary system for controlling the advertising of cigarettes. pp. 9795-6
5. ALASKA CLAIMS COMMISSION. Confirmed the nominations of Maurice Oaksmith, Ray Ward, and W. C. Arnold to be members of the Temporary Alaska Claims Commission. p. 9800
6. STOCKPILING. Received the report of the Joint Committee on Reduction of Non-essential Federal Expenditures on Federal stockpile inventories, including CCC commodity inventories, as of Feb. 1964. pp. 9729-38
7. PERSONNEL; PAY. Received the report of the Joint Committee on Reduction of Nonessential Federal Expenditures on Federal employment and pay for March 1964. pp. 9738-41

HOUSE

8. WATER RESEARCH. The House Rules Committee reported a resolution for the consideration of S. 2, to establish water resource research centers at the land-grant colleges and State universities and promote a more adequate national program of water research. p. 9727
9. ATOMIC ENERGY. The House Rules Committee reported a resolution of the consideration of H. R. 10945, to authorize appropriations to the Atomic Energy Commission. p 9727
10. STOCKPILING. The House Armed Services Committee voted to report (but did not actually report) H. R. 10774, to authorize the disposal, without regard to the prescribed six-month waiting period, of cadmium from the national stockpile and the supplemental stockpile. p. D349
11. WATER POLLUTION. Rep. Thompson (Tex.) expressed concern over the problems of pollution of our waterways and inserted a speech which suggests that "Local, State and Federal agencies and representatives of our industry can work jointly, cooperatively, and harmoniously in identifying, analyzing and developing practical solutions to our problems." pp. 9716-18
12. WATER UTILIZATION. Rep. Hull stated that the hope for economic development and future prosperity in some states "which are blighted by a continuing exodus away from the farms" rests "to a substantial degree on proper use of water resources," and inserted an editorial, "Big Dams are Winning the War For Water." pp. 9725-6
13. POVERTY. Rep. Kilburn inserted a letter from a constituent asking him to "work against the so-called war against poverty bill." pp. 9711-2

CONSIDERATION OF S. 2

MAY 5, 1964.—Referred to the House Calendar and ordered to be printed

Mr. SISK, from the Committee on Rules, submitted the following

R E P O R T

[To accompany H. Res. 711]

The Committee on Rules, having had under consideration House Resolution 711, report the same to the House with the recommendation that the resolution do pass.

○

THE UNIVERSITY OF CHICAGO

1895

1896

1897

1898

1899

1900

House Calendar No. 232

88TH CONGRESS
2D SESSION

H. RES. 711

[Report No. 1377]

IN THE HOUSE OF REPRESENTATIVES

MAY 5, 1964

Mr. SISK, from the Committee on Rules, reported the following resolution;
which was referred to the House Calendar and ordered to be printed

RESOLUTION

1 *Resolved*, That upon the adoption of this resolution it
2 shall be in order to move that the House resolve itself into
3 the Committee of the Whole House on the State of the
4 Union for the consideration of the bill (S. 2) to establish
5 water resources research centers at land-grant colleges and
6 State universities, to stimulate water research at other col-
7 leges, universities, and centers of competence, and to promote
8 a more adequate national program of water research. After
9 general debate, which shall be confined to the bill and shall
10 continue not to exceed two hours, to be equally divided and
11 controlled by the chairman and ranking minority member of

1 the Committee on Interior and Insular Affairs, the bill shall
2 be read for amendment under the five-minute rule. It shall
3 be in order to consider the substitute amendment recom-
4 mended by the Committee on Interior and Insular Affairs
5 now printed in the bill, and such substitute for the purpose
6 of amendment shall be considered under the five-minute rule
7 as an original bill. At the conclusion of such consideration
8 the Committee shall rise and report the bill to the House
9 with such amendments as may have been adopted, and any
10 member may demand a separate vote in the House on any
11 of the amendments adopted in the Committee of the Whole
12 to the bill or committee substitute. The previous question
13 shall be considered as ordered on the bill and amendments
14 thereto to final passage without intervening motion except
15 one motion to recommit with or without instructions.

88TH CONGRESS
2^D SESSION

H. RES. 711

[Report No. 1377]

RESOLUTION

Providing for consideration of S. 2, a bill to establish water resources research centers at land-grant colleges and State universities, to stimulate water research at other colleges, universities, and centers of competence, and to promote a more adequate national program of water research.

By Mr. SISK

MAY 5, 1964

Referred to the House Calendar and ordered to be printed

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OFFICE OF
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(For information only;
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88th-2nd; No. 109

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HIGHLIGHTS: House passed water resources research centers bill. House subcommittee voted to report wilderness preservation bill. Rep. Latta criticized USDA statement on wheat signup as misleading. Rep. Poage commended watershed program. Rep. Latta inserted item stating farm income at 7-year low. Senate committee voted to report bills to extend Reorganization Act and to provide periodic congressional review of Federal grants-in-aid. Senate committee reported bill to minimize pesticide injury to fish and wildlife.

HOUSE

1. WATER RESEARCH. Passed with amendments S. 2, to provide for the establishment of water resources research centers at land-grant colleges and State universities (pp. 12028-46). Agreed to an amendment by Rep. Aspinall to provide that sums available to the States shall be paid to designated institutes at such times and in such amounts during each fiscal year as determined by the Secretary of the Interior (p. 12044). Agreed to an amendment by Rep. Daddario to provide that the Secretary of the Interior shall adhere to the Statement of Government Patent policy in carrying out the provisions of the bill (pp. 12044-6). As passed, the bill includes provisions as follows: Authorizes appropriations to the Secretary of the Interior for a 10-year water resources research grant program to establish water resources research centers in the land-grant college, or other college or university as the State legislature may designate, in each State and in Puerto Rico. Provides that each research center shall be entitled to receive \$75,000 the first year of the program, \$87,500 the second and third years, and \$100,000 each year thereafter. Permits two or more States to cooperate in designating a single interstate or regional

research center which would receive the funds assignable to each of the cooperating States. Authorizes the appropriation of an additional \$1 million the first year, and increasing to \$5 million in the fifth year and each year thereafter through the tenth year, to be available on a dollar-for-dollar matching basis to the State research centers on the basis of specific research proposals. Requires the Secretary of the Interior to consult with and obtain the continuing advice and cooperation of all Federal agencies concerned with water problems in administering the program. Makes clear that this legislation does not repeal, supersede, or diminish existing authorities or responsibilities of other Federal agencies for planning and conducting water resources research. Directs the President to establish a center for cataloging current and projected scientific research in all fields of water resources. Directs the President to clarify agency responsibilities for Federal water resources research and to provide for effective inter-agency coordination of such research.

2. WILDERNESS. The Subcommittee on Public Lands of the Interior and Insular Affairs Committee voted to report to the full committee with amendments H. R. 9070, to provide for the establishment of a National Wilderness System. p. D433
3. WHEAT. Rep. Latta stated that a USDA press release on the signup under the new wheat program neglected "to tell the full story of this signup as it relates to allotment wheat farms and wheat farmers," and he reviewed the percentage of signup by types of farms and by States. pp. 12025-6
4. WATERSHEDS. Rep. Poage commended the SCS watershed program on its 10th anniversary and stated that he has requested that an SCS compendium of benefits under the watershed program be sent to each Member of the House. p. 12047
5. FARM INCOME. Rep. Latta inserted a UPI release stating that in mid-May farm income declined to the lowest level since 1957 which was caused principally by lower prices for cattle, wholesale milk, and eggs. p. 12052
6. FARM LABOR. Rep. Talcott inserted an article quoting a Teamsters Union official as stating that the union could not supply sufficient domestic labor to replace Mexican farm laborers and favoring extension of the Mexican farm labor program for an additional five years. pp. 12048-50
7. DEFICIENCY APPROPRIATION BILL, 1964. House conferees were appointed on this bill, H. R. 11201 (p. 12025). Senate conferees have already been appointed.
8. COMMITTEE ASSIGNMENTS. Rep. Hull, Mo., resigned from the Interstate and Foreign Commerce Committee and was elected a member of the Appropriations Committee. p. 12025
9. PURCHASING. Both Houses received from GAO a "report on a review of uneconomical practices relating to brand name procurements, Federal Supply Services, General Services Administration." pp. 11948, 12063

SENATE

10. PESTICIDES. The Commerce Committee reported with amendments S. 1251, to prevent or minimize injury to fish and wildlife from the use of insecticides and pesticides (S. Rept. 1053). p. 11949

to exceed 42 men, 10 are to be appointed at this time with the balance being appointed subject to and with the approval of the Committee on House Administration at such time as they may be needed to complete the police force for the Rayburn Building. In other words, the resolution covers the total number required for the convenience of the appropriations subcommittee on legislative appropriations, but does limit the present appointment to not to exceed 10 and additional ones can be appointed only with the approval and consent of the Committee on House Administration.

Mr. FRIEDEL. The gentleman is correct.

Mr. SCHENCK. I thank the gentleman.

The SPEAKER. The question is on the committee amendments.

The committee amendments were agreed to.

The resolution was agreed to.
A motion to reconsider was laid on the table.

TO PROVIDE FUNDS FOR THE COMMITTEE ON THE JUDICIARY UNDER PUBLIC LAW 86-272

Mr. FRIEDEL. Mr. Speaker, by direction of the Committee on House Administration, I call up the resolution (H. Res. 653) and ask for its immediate consideration.

The Clerk read the resolution, as follows:

Resolved, That the additional expenses of conducting the studies authorized by Public Law 272 of the Eighty-sixth Congress, as amended, incurred by the Committee on the Judiciary, acting as a whole or by subcommittee, not to exceed \$150,000 including expenditures for the employment of experts, special counsel, clerical, stenographic, and other assistants, and all expenses necessary for travel and subsistence incurred by members and employees while engaged in the activities of the committee or any subcommittee thereof, shall be paid out of the contingent fund of the House on vouchers authorized by such committee signed by the chairman of such committee and approved by the Committee on House Administration.

With the following committee amendment:

Following line 13, insert the following:
"SEC. 2. The chairman of the Committee on the Judiciary shall furnish the Committee on House Administration information with respect to any study or investigation intended to be financed from such funds. No part of the funds authorized by this resolution shall be available for expenditure in connection with the study or investigation of any subject which is being investigated for the same purpose by any other committee of the House."

Mr. SCHENCK. Mr. Speaker, will the gentleman yield?

Mr. FRIEDEL. I am glad to yield to the gentleman from Ohio.

Mr. SCHENCK. Mr. Speaker, I understand that this entire amount is to be used by the special subcommittee for the matter of the study of income tax questions as they relate to interstate commerce and the income taxes of the various individual States.

Mr. BECKER. Mr. Speaker, will the gentleman yield?

Mr. FRIEDEL. I yield to the gentleman from New York.

Mr. BECKER. Mr. Speaker, I wish to ask the gentleman from Maryland a question. Is this \$150,000 to be used entirely by the Willis subcommittee to provide material or information to the taxpayers and business people of this Nation, to give them all the information acquired by a staff study?

Mr. FRIEDEL. This \$150,000 is for the Special Subcommittee on Taxation in Interstate Commerce, which subcommittee is headed by the gentleman from Louisiana [Mr. WILLIS].

Mr. BECKER. I feel quite certain that the gentleman from Louisiana [Mr. WILLIS] will use the money wisely and well, as needed. I thank the gentleman.

The SPEAKER. The question is on the committee amendment.

The committee amendment was agreed to.

The resolution was agreed to.
A motion to reconsider was laid on the table.

TO PROVIDE FUNDS FOR THE FURTHER EXPENSES OF THE STUDIES, INVESTIGATIONS, AND INQUIRIES AUTHORIZED BY HOUSE RESOLUTION 143 OF THE 88TH CONGRESS

Mr. FRIEDEL. Mr. Speaker, by direction of the Committee on House Administration, I call up the resolution (H. Res. 658) and ask for its immediate consideration.

The Clerk read the resolution, as follows:

Resolved, That the further expenses of the studies, investigations, and inquiries authorized by H. Res. 143 of the Eighty-eighth Congress, incurred by the Committee on Science and Astronautics, acting as a whole or as a duly authorized subcommittee, not to exceed \$175,000, including expenditures for employment, travel, and subsistence of attorneys, experts, and consultants (including personnel of the Library of Congress performing services on reimbursable detail), and clerical, stenographic, and other assistants, shall be paid out of the contingent fund of the House on vouchers authorized by such committee, signed by the chairman of such committee, and approved by the Committee on House Administration.

SEC. 2. No part of the funds authorized by this resolution shall be available for expenditure in connection with the study or investigation of any subject which is being investigated for the same purpose by any other committee of the House, and the chairman of the Committee on Science and Astronautics shall furnish the Committee on House Administration information with respect to any study or investigation intended to be financed from such funds.

Mr. SCHENCK. Mr. Speaker, will the gentleman yield?

Mr. FRIEDEL. I yield to the gentleman from Ohio.

Mr. SCHENCK. Will the gentleman from Maryland tell the House the total amount of appropriations for the Committee on Science and Astronautics, for both last year and this year?

Mr. FRIEDEL. One hundred and

fifty thousand dollars was authorized in the 1st session of the 88th Congress. This would be \$175,000 more. The total amount would be \$325,000. In the 87th Congress they got \$300,000.

Mr. SCHENCK. If the gentleman will yield further, may I inquire as to whether there is any balance in the appropriations made for the 1st session of the 88th Congress?

Mr. FRIEDEL. As of May 26 there was a small amount of \$8,000 still available. That did not take care of the expenses for the month of June, so the funds have probably all been used already.

Mr. SCHENCK. If the gentleman will yield further, I wish to point out that many Members of the House feel it would be a matter of good judgment to delay somewhat the so-called moonshot, and, therefore, that this money should be spent with a great deal of care and judicious use.

I am sure the chairman of the committee, the gentleman from California [Mr. MILLER], will observe this desired prudence.

Mr. FRIEDEL. I am sure the Committee on Science and Astronautics will exercise good judgment in their use of the funds. The \$175,000 is not too much money when you consider that they have a budget of over \$5 billion to supervise. This is the amount NASA was granted.

Mr. SCHENCK. I thank the gentleman.

The SPEAKER. The question is on the committee amendment.

The committee amendment was agreed to.

The resolution was agreed to.

A motion to reconsider was laid on the table.

TO PROVIDE ADDITIONAL FUNDS FOR EXPENSES OF STUDIES, AND SO FORTH, AUTHORIZED BY HOUSE RESOLUTION 153

Mr. FRIEDEL. Mr. Speaker, by direction of the Committee on House Administration, I call up House Resolution 735 and ask for its immediate consideration.

The Clerk read the resolution, as follows:

Resolved, That the further expenses of conducting the studies, investigations, and inquiries authorized by H. Res. 153, Eighty-eighth Congress, incurred by the Committee on Banking and Currency, acting as a whole or by subcommittee, not to exceed \$125,000 in addition to the unexpended balance of any sums heretofore made available for conducting such studies, investigations, and inquiries, including expenditures for employment, travel, and subsistence of accountants, experts, investigators, and clerical, stenographic, and other assistants, shall be paid out of the contingent fund of the House, on vouchers authorized by such committee or subcommittee, signed by the chairman of such committee or subcommittee, and approved by the Committee on House Administration.

SEC. 2. No part of the funds authorized by this resolution shall be available for expenditure in connection with the study or investigation of any subject which is being

investigated for the same purpose by any other committee of the House, and the chairman of the Committee on Banking and Currency shall furnish the Committee on House Administration information with respect to any study or investigation intended to be financed from such funds.

The resolution was agreed to.

A motion to reconsider was laid on the table.

AUTHORIZING PRINTING OF ADDITIONAL COPIES OF HEARINGS OF JOINT COMMITTEE ON ATOMIC ENERGY

Mr. HAYS. Mr. Speaker, by direction of the Committee on House Administration, I call up Senate Concurrent Resolution 73 and ask for its immediate consideration.

The Clerk read the Senate concurrent resolution, as follows:

Resolved by the Senate (the House of Representatives concurring), That there be printed for the use of the Joint Committee on Atomic Energy two thousand additional copies each of part 2 and part 3 of its hearings on the Atomic Energy Commission authorizing legislation, fiscal year 1965.

The Senate concurrent resolution was concurred in.

A motion to reconsider was laid on the table.

DISPENSING WITH THE CALL OF THE PRIVATE CALENDAR

Mr. ALBERT. Mr. Speaker, I ask unanimous consent that the call of the Private Calendar be dispensed with today.

The SPEAKER. Is there objection to the request of the gentleman from Oklahoma?

There was no objection.

KEITH HILLS

Mr. SMITH of Virginia. Mr. Speaker, I ask unanimous consent for the immediate consideration of the bill—H.R. 10407—for the relief of Keith Hills.

The Clerk read the title of the bill.

The SPEAKER. Is there objection to the request of the gentleman from Virginia?

There was no objection.

The Clerk read the bill, as follows:

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That, notwithstanding the provision of section 212(a) (4) of the Immigration and Nationality Act, Keith Hills may be issued a visa and admitted to the United States for permanent residence if he is found to be otherwise admissible under the provisions of that Act: Provided, That this exemption shall apply only to a ground for expulsion of which the Department of State or the Department of Justice had knowledge prior to the enactment of this Act: Provided further, That a suitable and proper bond or undertaking, approved by the Attorney General, be deposited as prescribed by section 213 of the said Act.

The bill was ordered to be engrossed and read a third time, was read the third time, and passed, and a motion to reconsider was laid on the table.

ESTABLISHING WATER RESOURCES RESEARCH CENTERS

Mr. SISK. Mr. Speaker, by direction of the Committee on Rules, I call up House Resolution 711 and ask for its immediate consideration.

The Clerk read the resolution, as follows:

Resolved, That upon the adoption of this resolution it shall be in order to move that the House resolve itself into the Committee of the Whole House on the State of the Union for the consideration of the bill (S. 2) to establish water resources research centers at land-grant colleges and State universities, to stimulate water research at other colleges, universities, and centers of competence, and to promote a more adequate national program of water research. After general debate, which shall be confined to the bill and shall continue not to exceed two hours, to be equally divided and controlled by the chairman and ranking minority member of the Committee on Interior and Insular Affairs, the bill shall be read for amendment under the five-minute rule. It shall be in order to consider the substitute amendment recommended by the Committee on Interior and Insular Affairs now printed in the bill, and such substitute for the purpose of amendment shall be considered under the five-minute rule as an original bill. At the conclusion of such consideration the Committee shall rise and report the bill to the House with such amendments as may have been adopted, and any member may demand a separate vote in the House on any of the amendments adopted in the Committee of the Whole to the bill or committee substitute. The previous question shall be considered as ordered on the bill and amendments thereto to final passage without intervening motion except one motion to recommit with or without instructions.

Mr. SISK. Mr. Speaker, I yield 30 minutes to the gentleman from Ohio [Mr. BROWN]; and pending that I yield myself such time as I may consume.

Mr. Speaker, House Resolution 711 provides for consideration of S. 2, a bill to establish water resources research centers at land-grant colleges and State universities, to stimulate water research at other colleges, universities, and centers of competence, and to promote a more adequate national program of water research. The resolution provides an open rule with 2 hours of general debate, making it in order to consider the committee substitute.

The purpose of S. 2 is to strengthen the contribution that universities can make to water resources research and to graduate education in water resources. The expansion of water resources research that would be provided by the enactment of this legislation would be helpful in coping with the mounting water-use problems posed by the projected growth of our population and economy. The program would assist both in providing answers to our water problems at the local and State level and in meeting the critical need for additional hydroscintists. The Secretary of the Interior would be charged with the responsibility for proper administration of the program and for assuring that effective research work is conducted.

The legislation authorizes a water resources research grant program that provides for establishing research centers or

institutes in a land-grant college or another institution in each State and in Puerto Rico. Sufficient funds are authorized to be appropriated so that each research center would receive a Federal grant of \$75,000 in the first year of the program, \$87,500 in the second and third years, and \$100,000 thereafter for the life of the program. Two or more States could cooperate in the establishment of a single interstate or regional research center, in which event the sums assignable to all of the cooperating States would be available to that research center.

Additional funds would be available to the research centers on a dollar-for-dollar matching basis. These funds would be allocated by the Secretary of the Interior on the basis of specific research proposals by the research centers. The overall limitation on these matching funds would be \$1 million in the first year of the program, increasing to \$5 million in the fifth year and thereafter for the life of the program.

The life of the program is limited to 10 years in order to give the Congress an opportunity to review the program and determine the need for extension, modification, and so forth.

Mr. Speaker, I urge the adoption of House Resolution 711.

Mr. BROWN of Ohio. Mr. Speaker, I yield myself such time as I may consume.

(Mr. BROWN of Ohio asked and was given permission to revise and extend his remarks.)

Mr. BROWN of Ohio. Mr. Speaker, the gentleman from California, my colleague on the Rules Committee [Mr. Sisk] explained this rule. He has very well explained the purpose of this bill.

Mr. Speaker, as I understand this measure it will probably entail a total cost over the next 10-year period of something like \$50 million to \$55 million.

Mr. ASPINALL. Mr. Speaker, will my colleague yield to me?

Mr. BROWN of Ohio. Yes.

Mr. ASPINALL. I would like to have the Record thoroughly accurate in this particular matter. There could be a total cost over the 10-year period of \$88,450,000; that is the authorization. That depends entirely upon the appropriations process.

Mr. BROWN of Ohio. Yes; if all the appropriations are made.

However, I understood that under one section of the bill the appropriations would be limited to \$5 million a year; is that right?

Mr. ASPINALL. If the gentleman will yield further, that is right but there are two different programs. One program would have a total authorization of \$48,450,000 and the other would have a total authorization of \$40 million.

Mr. BROWN of Ohio. I understand. I was under the impression, however, that the total expenditure was limited to \$50 million. Most of the States and most of the universities scheduled to receive benefits under this program of course are very much interested in it.

It is, the same old story—anyone who can get Federal funds is anxious to receive them.

There is no opposition about which I know—no organized opposition—to this particular bill. There is a great deal of support for it from the universities and the different organizations which are interested in the water problem in all of our various States.

Mr. Speaker, I presume this measure, like other measures of this type, will be enacted, be approved by the Congress, and, become law, and will again, of course, increase the general expenditures of the Federal Government.

I am hoping that some day—while I feel that this is a good cause and that this is a good activity here proposed—we may be able to have legislation before this House that will actually reduce public spending a little bit instead of increasing it. This bill represents a very slight increase in Federal spending, but it does embark the Federal Government upon a new program of Federal grants or Federal aid to the States and to State universities and land-grant colleges.

Mr. SAYLOR. Mr. Speaker, will the gentleman yield?

Mr. BROWN of Ohio. I yield to the gentleman from Pennsylvania.

Mr. SAYLOR. Mr. Speaker, I would like to say to my colleague, the gentleman from Ohio [Mr. BROWN], that while in the first instance the first section of this bill does authorize the expenditure of additional Federal moneys, if the gentleman will look at the second section of this bill, I believe that there he will find a method wherein money will be saved. For the first time we are going to try and correlate and determine what agencies of the Federal Government are doing research in water and try to make sure that any duplication that exists at the present time is eliminated.

I am sure that this will result in saving the Government money.

Mr. BROWN of Ohio. I agree with the gentleman but, of course, I recognize the fact, as I am sure the gentleman from Pennsylvania does, that we are already spending a great deal more than this amount—in fact, millions and millions and millions of dollars on water research—not only by the Federal Government but by some of our States and other political subdivisions, as well as through some of our universities.

This bill of course—this amount, speaking of water—is simply a drop in the bucket in comparison to some of the expenditures we have made.

Mr. Speaker, some day, perhaps, we will solve our water problems, and they are serious ones. One water problem on which the Government has been working for a long while is to take salt out of sea water. Whenever there is developed some practical, economical method worked out whereby the salinity of sea water can be eliminated and fresh water made from it at a cost which can be afforded, and can be met by the consuming public, it will remake the face of the world, of course; and will solve many of the problems that perhaps these very same institutions may be working on under this proposed program or programs.

Mr. Speaker, I have no particular objection to this legislation but I do think we should realize that again it is another step in having the Federal Government move a little but further toward making grants—let us put it that way—or furnishing funds, to the various States and to local institutions for this purpose.

Mr. SPRINGER. Mr. Speaker, will the gentleman yield?

Mr. BROWN of Ohio. I yield to the gentleman from Illinois.

Mr. SPRINGER. I have asked the gentleman from Ohio to yield to me for the purpose of asking the chairman of the Committee on Interior and Insular Affairs a question. Mr. Chairman, is there an overall correlated program of water research by the Federal Government at the present time?

Mr. ASPINALL. If my colleague will yield further, the answer is "No." This legislation sets up such a program. It is the thinking of the members of the committee that we more than likely can save the expense of the program by seeing to it that this coordinated program is adhered to.

Mr. BROWN of Ohio. May I answer the gentleman's question a little further?

I happen to be the ranking member of a House select committee which is making a study of Federal research activities. There is no correlated or coordinated program of any kind on the part of the Federal Government dealing with all sorts of research. Nobody seemingly knows what anyone else is doing. There is no practical method whereby someone passes judgment, before they start a research project, as to whether or not it makes sense to attempt to do it, or find out whether it will be worthwhile. Our committee is finding a great deal of money is being spent on research, some of it of great value, some of questionable value; but there is no great central authority over research, despite the fact we have the National Science Foundation under the gentleman's committee. None actually supervises, none knows for certain just what other agencies of the Government are doing. I find that is not only true, as far as water research is concerned, but as to many other research activities as well.

Mr. SPRINGER. May I ask the chairman of the committee this further question: As I understand from reading the report and bill, this research will only be done at already authorized land-grant colleges?

Mr. ASPINALL. The legislation pinpoints the first authority to land-grant colleges. Where there is more than one, two or more, then the Governor will have the authority to choose the particular land-grant college. If the State legislature and the Government decides to have it go to some other institution, rather than the land-grant college, then they can do so by statutory enactment on the part of the legislature.

Mr. SPRINGER. In order for the State to take it from a land-grant college, there would have to be the authority by enactment of the State legislature?

Mr. ASPINALL. That is true.

Mr. SPRINGER. If the land-grant college does not want to do the research,

then the Governor may assign to any other college that wishes it?

Mr. ASPINALL. Any other land-grant college. If there is only one land-grant college then the legislature and Governor must act in order to take it to another institution.

Mr. SPRINGER. One further question:

Is the work assigned by a Federal agency to the land-grant college or does the land-grant college submit a plan to the Federal agent, and have it approved first?

Mr. ASPINALL. The grant-land college submits a plan to the Secretary of the Interior. The Secretary of the Interior then coordinates and correlates this with other activities in the same field throughout the United States to see that duplication is kept at a minimum.

Mr. BROWN of Ohio. It is the responsibility of the Secretary of the Interior to correlate, not the universities themselves.

Mr. SPRINGER. One further question:

Will the research being done by the land-grant college in that particular State have to do with the water problem in that particular area, that State and surrounding area?

Mr. ASPINALL. That is what we are hoping for.

Mr. BROWN of Ohio. Presumably so. There is no guarantee that will be so.

Mr. SPRINGER. I thank the gentleman.

Mr. BROWN of Ohio. Mr. Speaker, I know of no opposition to the rule or to the bill itself, and I have no further requests for time.

Mr. SISK. Mr. Speaker, I move the previous question.

The previous question was ordered.

The SPEAKER. The question is on the resolution.

The resolution was agreed to.

IN THE COMMITTEE OF THE WHOLE

Mr. ROGERS of Colorado. Mr. Speaker, I move that the House resolve itself into the Committee of the Whole House on the State of the Union for the consideration of the bill S. 2—to establish water resources research centers at land-grant colleges and State universities, to stimulate water research at other colleges, universities, and centers of competence, and to promote a more adequate national program of water research.

The motion was agreed to.

Accordingly, the House resolved itself into the Committee of the Whole House on the State of the Union for the consideration of the bill S. 2, with Mr. SMITH of Iowa in the chair.

The Clerk read the title of the bill.

By unanimous consent, the first reading of the bill was dispensed with.

Mr. ROGERS of Texas. Mr. Chairman, I yield 10 minutes to the distinguished chairman of the Committee on Interior and Insular Affairs, the gentleman from Colorado [Mr. ASPINALL].

(Mr. ASPINALL asked and was given permission to revise and extend his remarks.)

Mr. ASPINALL. Mr. Chairman, the purpose of the legislation we bring to the

floor today is to strengthen the contribution that universities can make to water resources research and to graduate education in water research. The legislation will establish a new non-Federal water resources research program which is designed particularly to cope with the mounting water problems at State level.

The dominant conservation issue for the next several decades will undoubtedly be the matter of providing an adequate water supply to meet the needs of our exploding population and expanding industry and agriculture. In a very few years, we will have to supply water to meet the needs of 300 million people. If the Nation is to meet this challenge in the water field, water research must necessarily play an important role. I believe that no one questions the need for expanding water resources research activities. The question involved here is the extent of Federal financial assistance in order to encourage and assure the research which is necessary. In considering financial assistance from the Federal Government, however, we must be sure that the expenditures go toward worthwhile research and contribute to or overall national water research effort, and at the same time keep duplicatory programs and activities at a minimum. We have tried to make certain in this legislation that the limited expenditures authorized are fully justified. I believe we have provided the guidelines and the controls that are needed to assure extensive benefits and returns to the Nation for the dollars spent in this relatively small and much needed program.

The legislation that came over from the other body provided for a larger program than that approved by our committee and included in the legislation before us today. Dollarwise, we reduced the program 50 percent and limited the life of the program to 10 years in order that Congress might have another look at it at the end of that period to determine whether it should be continued and, if so, whether modifications or changes are needed. Since we are embarking on a new program, the committee felt that a modest approach should be taken initially, with an opportunity for review to see how it is working out.

The Secretary of the Interior would be charged with the responsibility for proper administration of the program and for assuring that effective research work is conducted. We believe that the Secretary of the Interior can meet this responsibility without any appreciable increase in supervisory personnel or without establishing any new office or agency.

Under the language we approved, sufficient funds would be authorized to provide for establishing a water resources research center in a land-grant college or some other institution in each State and in Puerto Rico. Additional funds would be available to the research centers on a dollar-for-dollar matching basis and on the basis of specific research proposals, approved by the Secretary. The overall cost, for both the State grants and the matching funds, would run from about \$4.8 million in the first year to about \$10 million in the fifth

year and thereafter for the 10-year life of the program. The gentleman from Texas [Mr. ROGERS] the able chairman of the subcommittee which handled this legislation, will present a more detailed analysis of the legislation.

The committee spent 6 days in public hearings on this legislation, receiving testimony from the Federal departments involved in water resources research and development, and from numerous representatives of States, colleges, and universities, and organizations interested in water development. The committee is convinced that State or regional research centers connected with colleges or universities will contribute greatly to our national water research effort. Much of the research in the water field must be undertaken in the geographical areas concerned. Regional variations in water resources problems can be better attacked by State research centers rather than by a single consolidated research facility. The problems that exist among the States vary greatly. The differences involve not only great variations in the nature of the resource itself and the degree to which the resource has been developed, but also in the detail of the economic and social structure. Differences in climate, elevation, and soil have generated considerable differences in problems of agricultural use of water. The differences in economic detail as among the States may even be greater than the resource differences. The particular lines which future economic development may take are greatly influenced by the nature of natural resources other than water, by transportation, the degree of urbanization, educational activities, recreational needs, and so forth, and these differences lead to different policies and objectives.

Linking research and education in the water field will also provide a continued flow of competent trained scientific manpower in water resources research. At the present time there is a shortage of personnel qualified to undertake much of the needed research related to water. Additional hydrologists, hydroengineers, hydroscintists, and so forth, must be trained if we are to have an adequate national water research effort. The presence of a water research center within a college or university will provide the catalyst for increasing the number of scientists, engineers and other specialists that are needed.

The most important part of this legislation may turn out to be, not the new research program at State level, but the provisions in title II which call for establishing a center for cataloging scientific research in all fields of water resources, and give congressional direction to the President to clarify Federal agency responsibilities for water resources research and provide adequate and effective interagency coordination of all water research activities. This latter provision was not in the legislation that came over from the other body. Under this language it will be essential for the President to determine what measures must be taken in order to eliminate the duplication and waste that has occurred in the past in the overall Federal water

research effort. I believe that Mr. SAYLOR is going to discuss this aspect of the legislation in more detail but suffice it to say that there are numerous Federal departments and agencies carrying on water resources research activities under their programs and authority without their programs being related to one another or without paying much attention to what the others are doing in this field. It is my hope that this direction to the President for providing effective interagency coordination will save the Federal Government more than sufficient funds to carry on the new research program we are establishing.

There is one provision in this bill which I am sure will be brought up in our consideration today. It is the language providing for not more than one research center in each State, with this center to be located at the land-grant college unless the State legislature designates some other institution. If there are two land-grant colleges in the State, which is the case in several States, the Governor would have authority to make the designation. I would like to point out that the designation of the college or institution in each State is left to the State if the State wants to assume this responsibility. The committee strongly believes that there should be no more than one research center in each State. Further dissipation of the funds, we believe, would result in very little worthwhile research being accomplished. This is the reason we deleted the provision included in the legislation that came over from the other body which provided no limitation on the number of colleges or institutions which could share in the grant. I might point out that there is nothing to prevent arrangements within a State whereby some of the research work can be done by institutions other than the one receiving the grant.

It should be made absolutely clear that this program is intended to contribute materially to our national effort in this field. Worthwhile research is expected on problems that exist and need to be resolved—problems of a local or regional nature. This is not to be a boondoggle or a program just to spread financial aid among universities and colleges throughout the Nation for them to build up their staffs.

Mr. Chairman, I believe the legislation which the Committee on Interior and Insular Affairs brings to the House today is needed and will contribute to this Nation's effort to provide adequate water supplies for our growing economy.

A question has been raised as to why we chose the land-grant colleges. I wish to advise my colleagues that the land-grant-college system came into existence in 1862, during the administration of President Lincoln, an administration filled with worthwhile projects for the people of the United States. There have been, throughout the decades of our national life, many suggestions that we have a University of the United States. The nearest we come to a University of the United States is the Federal Government's sponsorship of land-grant colleges. This, in effect, is the reason why we have chosen the land-grant colleges.

Those colleges have a record of having served in such programs, which especially benefit the agricultural and social interests of the areas in which they are located.

I believe this is good legislation. I hope it will receive the unanimous support of the Committee.

Mr. SAYLOR. Mr. Chairman, I yield myself such time as I may consume.

(Mr. SAYLOR asked and was given permission to revise and extend his remarks.)

Mr. SAYLOR. Mr. Chairman and members of the Committee, one of the most important elements, if not the most important element, with respect to sustaining life on this earth is water. Unfortunately, we in this country have used it with careless abandon. We have done no planning. We have wasted; we have plundered; we have robbed our waters. We have allowed our waters in many places to become polluted.

This bill is an attempt by the House Committee on Interior and Insular Affairs to bring some order out of the chaos which exists with regard to the water problems of this country.

I commend the chairman of the full committee, the gentleman from Colorado [Mr. ASPINALL], and the chairman of the subcommittee, the gentleman from Texas [Mr. ROGERS] for having seen to it that this legislation was heard before our committee and reported to the House.

The chairman of the full committee has discussed the phases of this bill which have to do with the study of water and water problems by the various land-grant colleges in this country. I am very much in favor of that study being conducted, because the problems of water are different in the various States in the Union. It is only as we have educated research by the various States on the problems which directly affect those States that we shall ever be able to solve the water problems of this country.

Mr. Chairman, I shall focus my remarks on the relationship between this legislation and our overall Federal Government effort in water resources research. It is my belief that the most important part of this legislation is the provisions which relate to interagency coordination of our research activities and are designed to eliminate duplication and waste. In all the days of testimony before our committee, the most often mentioned aspect of water research and most of the questions were related to the present lack of coordination among the numerous Federal departments and agencies already conducting water resources research and the resulting duplication and waste.

There are at the present time more than 2 dozen bureaus or equivalent units in eight major departments and independent agencies engaged in water resources research with overlapping responsibilities. It is not only the Committee on Interior and Insular Affairs that has been concerned with this situation. The distinguished chairman of the Interior Appropriations Subcommittee, the gentleman from Ohio [Mr. KIRWAN], and his ranking minority counterpart, the gentleman from Iowa [Mr. JENSEN],

has been trying to do something about this for years, and, more recently, a subcommittee of the Committee on Government Operations, headed by Bob JONES of Alabama, has exposed this Federal agency duplication and overlapping. Each of the numerous agencies has seen in water an opportunity to expand its operations and develop in importance, and this impetus for self-development has promoted interagency competition and jealousies. The executive branch has failed to provide a coordinated program with the efforts of each agency delineated on the basis of competency and experience, and, until the executive does this, we will continue to have duplication and waste of manpower and money. It has been my observation that those who continue to harangue the Congress and the public about a national water crisis are the most vocal in promoting individual agency growth rather than interagency coordination.

The Congress, of course, must shoulder a part of the blame for this situation. The authorizations of Congress to the several departments are so broad that each could take over the entire responsibility for water if it could obtain the money to do so. An example of what I mean is the assertion of the Public Health Service that water pollution control by that agency means that it is concerned with the total problem of water quality management. For instance, it is studying the salinity problem in the Colorado River Basin which specifically has been assigned by the Congress to the Department of the Interior. It is of utmost importance that agency responsibilities in this field be clarified.

In our committee's consideration of this problem of duplication and overlapping, we concluded that there were two requirements which could be written into S. 2 that would be helpful. First, the committee adopted language calling for the establishment of a cataloging center for cataloging current and projected scientific research in all fields of water resources. The direction to the President in the legislation for establishing this center does not specify which agency or office should be given the responsibility. However, the committee understands that the responsibility probably would be given to the Office of Science and Technology and that the actual cataloging would be done by the Science Information Exchange which is already established for the collection of other scientific information. The committee believes this provision is important because the publication of research and the collection of scientific information in one location is a major means by which duplication can be prevented.

The second and still more important requirement for preventing duplication is interagency coordination. The committee adopted language which directs the President to clarify Federal agency responsibilities for Federal water resources research and to provide adequate interagency coordination of all water resources activities, including research which would be authorized by the legislation we are considering today. This direction by law should strengthen the

hand of the President in resolving this problem. It should provide the authority needed to clarify and delineate agency responsibilities and to limit their operations, thereby providing full and effective coordination of all water resources research activities in the Federal establishment.

Mr. Chairman, I believe that the additional research which this legislation authorizes is needed and that the language which I have discussed providing for interagency coordination will result in saving both manpower and money. In all probability it will mean that the water research of the Federal Government would eliminate duplication, would eliminate waste and provide the greatest good for the entire country. I urge that this bill be adopted.

Mr. ROGERS of Texas. Mr. Chairman, I yield myself such time as I may consume.

(Mr. ROGERS of Texas asked and was given permission to revise and extend his remarks.)

Mr. ROGERS of Texas. Mr. Chairman, I think it would be well to have a short discussion of the separate titles in this bill and the separate sections of it. The bill, of course, has two titles, and there are several sections under each. Under title I, the research institutes, section 100(a), which is the first section of the bill, provides for a 10-year water research grant program by the Federal Government. These appropriations are to be made to the Secretary of the Interior and the payments by the Secretary of Interior to the land-grant college or other college or university designated by the State legislature are, of course, to be determined by the applications filed with the Secretary of the Interior.

Mr. WAGGONER. Mr. Chairman, will the gentleman yield?

Mr. ROGERS of Texas. I yield to the gentleman.

Mr. WAGGONER. Mr. Chairman, do I understand the gentleman correctly that this money is to be appropriated to the Secretary of the Interior; the Secretary of the Interior will allot to the respective States their proportionate allotments as set forth in the law and that this money, except by act of the State legislature must go to the already designated land-grant colleges?

Mr. ROGERS of Texas. With this exception: The application must be filed with the Secretary of the Interior and unless the application filed by the land-grant college or any other college, even that designated by the legislature, meets the requirements to carry out the purposes of this bill, then the Secretary of the Interior would not be, in my opinion, obligated to make the grant to that college simply because it was a land-grant college.

Mr. WAGGONER. Mr. Chairman, I thank the gentleman. Further, I want to commend the gentleman and the Committee on Interior and Insular Affairs, for bringing to the House this forward-thinking piece of legislation for action today. It is long past due. The time is close at hand when, unless we do take some affirmative steps to provide

for water resources development we are going to face a crisis in water which far exceeds the crisis which we anticipate in such problems as food. Again, Mr. Chairman, I commend the gentleman and his committee on this forward-thinking legislation.

Mr. ROGERS of Texas. Mr. Chairman, I thank the gentleman from Louisiana for his words on this subject and also for the splendid contribution he has made to the solution of the water problems since he came to Congress.

Proceeding with the sectional discussion, I would point out, in the first year of this program, as the able chairman of the committee, the gentleman from Colorado [Mr. ASPINALL] stated, the grant would be \$75,000 to each State; in the second and third years \$87,500 and \$100,000 for each year thereafter during the life of the program. What the House committee did was to cut this program just about half in two as it was presented in the original bill, S. 2, which was sent over from the other body. We did this for several reasons, but the primary reason was that we wanted to get a proper research program into focus, one that would be effective, one that would work. And we felt that we as the Congress ought to maintain control of this and see how it worked over a 10-year period. If it were not working right, we could make certain changes in it. If it were then working properly, we could extend the program.

Mr. Chairman, this goes to all of the States of the United States, the 50 States, and Puerto Rico.

Mr. Chairman, as the chairman of the Committee on Interior and Insular Affairs pointed out earlier, the money would go to the land-grant college in the State, if there is only one land-grant college. If there are two, then the Governor makes the designation. But in any event the legislatures of the several States will have the full power to control where this money goes, because we grant them in this proposed act the power to designate a college other than the land-grant college to receive these funds and to do this research work.

Mr. Chairman, it was thought that this was a move to preserve and protect the dignity and the power of the States or the rights of the State legislatures. Certainly, if they wanted to make a change, they should have the right to do so. Any of these institutions, however designated, must meet the capability requirements set up by the Secretary of the Department of the Interior to carry out an effective program.

Now, Mr. Chairman, a designated college or a university could make arrangements with other colleges or universities to participate in research work. However, I believe it would be well to point out that one reason we wanted this centered at one college was so that this overall program would not be fractionated or fragmented so that it would not be effective and we would have several colleges receiving a few thousand dollars each and nothing effective could be done.

Mr. Chairman, the question that has been asked of me most often is this: As to whether or not this research program

would make it possible for some activities to be carried on by institutions other than universities or colleges; for instance, a nonprofit organization which is engaged in water research work. My answer to that is this: I think that would depend upon the application made to the Secretary of the Department of the Interior, specifying the type research that they wanted to perform. Certainly, it ought to be within the power of the university or the land-grant college to farm out some work in connection with their overall projects to a nonprofit corporation or a profitmaking corporation as far as that is concerned, if this information is needed in the research problem with which they are working and could be obtained at a much cheaper cost, or even at a cheaper cost than if they had to set up new facilities at the university with which to perform this research. Certainly, I hope that will be the policy which will be followed.

Mr. JONAS. Mr. Chairman, will the gentleman yield?

Mr. ROGERS of Texas. I yield to my distinguished colleague, the gentleman from North Carolina [Mr. JONAS].

Mr. JONAS. I am not opposed to this bill, but am seeking a little information. It seems a little unusual to allocate the some amount of funds to every single State in the Union for purposes of research.

Now, is it the opinion of the committee that such widely diffused and dispersed research in every State would come nearer accomplishing the desired purposes than to concentrate this effort in, perhaps, fewer than the 50 States?

Mr. ROGERS of Texas. That problem was discussed at length, permit me to say to my distinguished colleague, and touched upon from many angles.

There is a provision in this act that would prevent Federal control of education. It was put in the bill because there was in the mind of the members of the committee the thought that there might be an attempt to federalize this situation; whereas, what we wanted to accomplish was to make it possible for the Federal Government to participate in an overall program, yet to preserve State rights, if you want to refer to it as that. We realized there were many different problems in different States having to do with water. One of the primary things we were seeking to accomplish was to utilize these educational institutions in order to make it possible for young people to become interested in this particular problem and this particular research, because the hearings that we had indicated that there is a marked shortage in our people who are willing to go into this program and to become teachers. It was felt this could be done at a much cheaper cost in the overall by letting these different educational institutions pursue this research and accomplish a twofold program.

Mr. JONAS. Will funds be available to "X" State, for example, if it does not have a program in this field, or will the funds be supplementary funds used to help an orderly program that the States already have?

Mr. ROGERS of Texas. Well, the re-

quirements set up by the Secretary of the Interior for effective research must be present in their application. It was anticipated there might be States that had perhaps a small operation in this research field that would want to join with another State or two or three other States, and put up one institution for regional development. Provision is made in this bill to take care of that situation so that these States can join together. But they not only must make a sound case when they present it to the Secretary of the Interior for the original grant, but they must report to him each year and the Secretary must report to the Congress of the United States on the development.

Mr. JONAS. The reason I ask that question is because I rather question how much research you can do for \$75,000. If this allocation is going to a State that is not interested in putting up some money also and does not have a center engaged in this work, how much effective work can be done with \$75,000?

Mr. ROGERS of Texas. The gentleman's point is very well taken. That is the reason we wanted the State to justify the research program it was going into. We realized the limited amount of money available here would make it necessary that they have some hardware, as the chairman of the full committee pointed out, and a program in operation in which they could move into other research fields by the coordinated use of other activities that they had.

Mr. HALEY. Mr. Chairman, will the gentleman yield?

Mr. ROGERS of Texas. I yield to the gentleman from Florida.

Mr. HALEY. Mr. Chairman, I, too, want to commend the chairman of my full committee and the distinguished gentleman from Texas, chairman of the subcommittee, for bringing this legislation to the Congress. It has long been needed.

May I ask this question: We have now various and sundry research programs in various departments of the Government, such as Agriculture, Commerce, Defense, Health, Education, and Welfare, Interior, TVA, and others. We now are spending approximately \$75 million per year on these programs.

Will this legislation not have a tendency to pull together these various programs so there will be some central place where anyone interested in water resources would be able to go to find what other departments of Government are doing? In this way we all would know exactly what is being done. This would draw these programs together, providing a place where anyone interested in water development could obtain information.

Mr. ROGERS of Texas. I thank the gentleman from Florida for bringing out this very important point. I might say it is one that the distinguished Member from Pennsylvania [Mr. SAYLOR] the ranking member of the Interior Committee, brought out so fine before the Rules Committee.

There is in this bill a specific provision for the cataloging of these activities in water research. There is also the additional proviso for the President

to clarify the coordination that ought to be brought about as between the different departments in water research. I think it would be a good thing for this country if laws dealing with research problems in other scientific fields could follow the predicate that has been laid down in this legislation to do just what the gentleman from Florida has pointed out. By this means we could find out what is going on in other departments, we may know what our needs are, and make much greater headway at much less cost, I think, than we have in the past.

Let me go on. We have acutely covered the most important sections. The second section of the act specifies the requirement that the research centers conduct competent research in proper relationship to training scientists, which was the point brought out by the gentleman from North Carolina.

In section 101(a) there is an additional proviso for additional funds for specific research proposals. These are available to State research centers, in the overall amount of \$1 million in the first year, increasing to \$5 million in the fifth year and thereafter during the 10-year period. These funds for these additional specific research proposals are available to the States only on a dollar-for-dollar matching basis. I think it would be well for everyone to be aware of that.

The next section of the bill, 101(b), provides for applications for grants under the first section of the bill.

Section 102 outlines the details for annual payments to the State institutions and requires an accounting by the State institution. It also requires an annual report on the research work accomplished. I think this is very important, and certainly a matter that should be included in the bill.

Section 103 authorizes the use of funds for printing and publishing the results of research and for administrative planning and direction, including cooperative research work. There was some objection to that in the committee, but after it was all studied out in this type of program, I think it is very important and very necessary.

Under section 104, the Secretary of the Interior is charged with the administrative responsibility for the program. Under this provision he is required to make an annual report to the Congress, which is of course most important and I am sure it will come to our committee.

Section 105 prohibits construction of this act as impairing or modifying the legal relation between colleges and the government of the State in which they are located. It also prohibits Federal control or direction of education, which is also important.

Under title II of the bill, section 200 provides for consultation between the Secretary of the Interior and other Federal agencies with research work problems, primarily to avoid duplication. This is the predicate being laid for what we were discussing a minute ago when the gentleman from Florida asked his question.

Section 201 provides that this act does not give the Secretary of the Interior

authority in research programs over other Federal agencies, that this act does not impair existing programs, but it does provide that there should be proper coordination between these different agencies, as referred to in section 204, which we will come to in a minute.

Section 202 provides contract arrangements can be made without regard to section 3684 of the revised statutes when the Secretary concludes that advance payments are necessary.

Section 203 provides for all information gained under this act to be made generally available to the public as against patent rights.

Section 204 directs the President to establish a center for cataloging scientific research information in all fields of water research—which is the very point that the gentleman from Florida brought out.

Section 205 directs the President to spell out agency responsibilities for Federal water resources research and to require effective interagency coordination.

That is a summation of the different sections of the bill. I think it is an excellent bill. I think it is starting in the right direction. I think if other segments of research would adopt this type of program we could make much additional headway.

Mr. ASPINALL. Mr. Chairman, will the gentleman yield?

Mr. ROGERS of Texas. I yield to the distinguished chairman of the full Committee on Interior and Insular Affairs, the gentleman from Colorado [Mr. ASPINALL].

Mr. ASPINALL. I think this would be an appropriate place to state to our colleagues that there will be an amendment offered to section 203 having to do with the patent provisions.

Mr. ROGERS of Texas. Yes, that amendment as I understand will be offered by the gentleman from Connecticut [Mr. DADDARIO].

Mr. McCLODY. Mr. Chairman, will the gentleman yield?

Mr. ROGERS of Texas. I am glad to yield to the gentleman.

Mr. McCLODY. I think the gentleman has made a most significant statement particularly with reference to the emphasis on water research in the States and in State universities or State land-grant colleges. I want to ask this question, however. It occurs to me that some regional centers have already been established for research, that is, Federal regional research centers, at least, they are in the planning stage. I wonder if the gentleman envisions any duplication between a Federal regional research center on the subject of water research on the one hand, and on the other hand a State research center or an interstate center since the bill also authorizes such State or interstate research centers?

Mr. ROGERS of Texas. I think the gentleman has raised an excellent point and one that was discussed by the committee as to the possible conflict or duplications on research activities on both the State and local level. Of course, we cannot and would not undertake to interfere with the State research program. But it was anticipated that the Secretary

of Interior in going into these applications for these grants to be used in a university or land-grant college could ask for information as to what practices and procedures were being pursued by the State on this particular problem and he could also then weigh that information against the information he had from these other agencies in the Federal Government to determine the justification for the particular research program that was being proposed. If there was a duplication or overlapping, we had hoped that the Secretary of Interior, and I am sure he would do so, make the suggestion to the applicant that certain changes be made so that there would be an effective research program in the field needed to be researched.

Mr. McCLODY. In other words, it is the intent of the Congress by the passage of this bill that there will be one research center in a particular region or area and that there will not be any duplication of regional research centers.

Mr. ROGERS of Texas. That is exactly right.

Let me add this thought. What we are hoping to do, as I said before, is to make it possible for some sort of incentive to be created so that young people will get into this work. We feel that by pursuing this method, although it does cost money and there is no question about that, and although it appears to be a lot of money, when you divide it between 50 States and Puerto Rico, then there is not much money for each one but we felt that if we could get this working and moving forward, we would get the effective research that we need and that the overall cost of the research programs could be cut down. We hope to get a lot of information and we hope that a lot of information will come from the select committee, which is headed by the gentleman from Alabama [Mr. ELLIOTT], involving these research development programs in all fields. But one of the primary things we want to do is to try to prevent duplication.

Mr. McCLODY. I feel that the bill is particularly significant and that the gentleman's statement is significant in that the water research is being centered on university or college campuses because in this way we are going to have the best opportunity to get new recruits, new talent and new skills for careers in these very important fields of hydrology and related science disciplines.

To encourage this concentration of research on the college campuses seems to me, at least, much more significant and much more important than having detached regional research centers not connected with college campuses.

I commend the committee for giving consideration to the university aspect, to the educational aspect, of water research and the further work which needs to be done in this field.

Mr. ROGERS of Texas. I thank the gentleman.

Mr. HALL. Mr. Chairman, will the gentleman yield?

Mr. ROGERS of Texas. I yield to the gentleman from Missouri.

Mr. HALL. I rise for some additional information. Some of it relates to the

questioning of my colleague from Illinois, who made inquiry, in his statement, of the subcommittee chairman, as well as the chairman of the full committee and the ranking minority member.

I should like to know the opinion of the subcommittee, after its deliberations and hearings and the research it has done on the problem of water and hydrology, for I am intensely interested in that subject, since I come from the great State of Missouri, surrounded, as it is, by other States interested in the same problems of the great riverways, such as the Missouri, the Illinois, and the Ohio, which all enter into the State of Missouri or into contiguous areas.

What are to be the relationships with the recently established Department of Health, Education, and Welfare regional research laboratories on hydrology? I have specifically in mind the one established last year, I believe at the University of Michigan at Lansing.

There are to be seven of those throughout the United States. They are either in the process of being established or are indeed now functioning.

Of course, I would wish to be sure that this work is in addition to but not a duplication of the work in those particular areas.

Can the gentleman give me some reassurance about that? After that I have another question.

Mr. ROGERS of Texas. Yes. As was brought out in the hearings, we hope that there will be no difficulty in getting complete coordination among the institutions to which the gentleman refers, and the facilities being established, and the procedures and facilities to be set up under this act. If there is any difficulty in this regard, we expect and we will continue to expect that the Secretary of the Interior will report the difficulties to the Congress in annual reports.

I believe it was the unanimous feeling of the subcommittee and of the full committee that if any difficulty is experienced in getting complete coordination in this area, Congress will move in to take affirmative action to correct it.

Mr. HALL. The gentleman from Texas does not feel that there may be a jurisdictional question as to research on hydrology between the Department of Health, Education, and Welfare, which has set up these seven large regional research laboratories on water, and the Department of the Interior or indeed the other concurring departments of the Cabinet, which have all agreed, as do I, that this is a good bill calling for a just use of Federal funds on a matching basis to stimulate State research on this most important problem of water conservation?

Mr. ROGERS of Texas. I wish to be completely honest with the gentleman from Missouri. I do not want the gentleman to believe for 1 minute that I have gotten myself to believe that there will not be jurisdictional fights. I believe we must be realistic in facing the problem. The committee realizes that there are going to be some conflicts. There are going to be some jurisdictional conflicts; but we hope that the passage of this legislation will spell out to the de-

partments involved that we want those conflicts reduced to a minimum and that if the conflicts are not reduced then we will expect to do something further about it.

That was the reason for title II in the bill, which says that the executive office should spell out the coordination which is expected in getting this job done. The Congress will have a report on this each year, as to how it is being done. There will be a cataloging facility so that the Congress can check at times, and, if Congress is not satisfied with what the Secretary has given to it, Congress can take action.

That is the reason why I think if other areas of research would use this same program, this country could be saved some real money.

Mr. HALL. I certainly hope what you say is true on both sides of the coin. I would hope that we can and we will maintain a sharp legislative oversight in this area to prevent duplication on the one hand. Yet, I would hope if there are to be regional research laboratories on this very vital problem, I think it is important that we make this legislative record, just as the gentleman who is in the well of the House now has, for the implementing regulations that would put this into effect. I hope that in those States which do now perchance have one of the seven regional centers or others that might be allocated or located in the future this will not preclude necessarily their participation at the State level because of variations in the water problem at the different State levels.

If I may continue now, I would like to ask a second question. Is it your thought, thinking of the health value of water in particular, which would be my forte, that this would apply not only to water tables and water levels and sources of water supply but maybe to research into the toxic problems that we are having with some of our water as well? I am particularly aware of the third annual great fish kill that has occurred on the Missouri River, which is a great source of industrial water and personal water use by individuals as well as for irrigation purposes and all of the other uses of water, which occurred probably as a result of pesticides used in areas far up the river. Of course, you know this happened way down in the big Mississippi River itself last year. I would hope that this research goes further than just establishing sources of water or replenishing and recycling water as a God-given resource for the use of the people and that we try to avoid the desecration and the pollution of this resource. Would the gentleman comment on that?

Mr. ROGERS of Texas. Yes. I think I would refer the gentleman to page 5 of the House report in which the statement is set forth there which came out of the Senate Select Committee on National Water Resources. I think that the particular items mentioned there on that page would include just about everything that you would think of with regard to water research and development, and certainly those having to do with health, as the gentleman points out.

Mr. HALL. I will say to the gentle-

man that I have read that, and that is one of the reasons why I asked the question. It deals with desalinization, which I think will eventually become an atomic energy problem insofar as the state of the art as it is now developing is concerned. However, I see nothing in there with regard to the toxins or the waste products of industry or pesticides and sprays in particular which must be used to produce foodstuffs and fibers and pest control. At the same time we must reserve usable potable waters for ourselves.

Mr. ROGERS of Texas. I refer the gentleman to subsection (e) on page 5 under "Justification and Need" where it says:

(e) Reduction of dilution requirements for pollution abatement by development of improved methods for treatment or control of waste materials that are disposed of in water.

Mr. HALL. I thank the gentleman, and I think we should add there "insecticides."

Mr. ROGERS of Texas. It is my understanding that the Senate had in mind the same things that the gentleman is talking about. Certainly I would hope that the departments downtown would consider this. That is what our committee thinks.

Mr. HALL. I thank the gentleman.

Mr. ASPINALL. Mr. Chairman, will the gentleman yield to me?

Mr. ROGERS of Texas. I yield to the chairman of the committee.

Mr. ASPINALL. I would like to clear up the RECORD on this. This part of the report from the Senate select committee was not put in here as a matter of limitation of activities but rather in explanation, and all the matters having to do with water and keeping it in a potable condition will be considered.

Mr. ROGERS of Texas. I thank the gentleman, and I think it is well to point out it was the feeling of the subcommittee and the committee under the gentleman from Colorado that the points made by the gentleman from Missouri about research with respect to pollution and the use of insecticides and pesticides was certainly within the thought of the committee in offering this legislation for passage to the House.

Mr. McCLORY. Mr. Chairman, will the gentleman yield?

Mr. ROGERS of Texas. I yield to the gentleman.

Mr. McCLORY. I want to add merely this. The Jones committee, to which the gentleman in the well made reference earlier, held hearings last week in Kansas City, Mo., with regard to the Missouri River Basin. I have the privilege of serving as a member of that subcommittee which is conducting a nationwide investigation of our water resources and of water pollution. I might say that in the course of the hearings there was a very strong case made for the establishment at the University of Kansas, or one of the universities in the Missouri River Basin, for the type of research center which would be possible under this legislation. I do not feel, especially with regard to the Missouri River Basin, that there would be any duplication so far as the projected regional research center of

the Public Health Service at Ann Arbor is concerned. I do not know whether it is in operation or has even yet been constructed. At any rate, I do not envision any duplication there. This legislation would enable the establishment on a college campus of the type of water research center which I think Congress has in mind and which is envisioned by this bill and by the report of the committee.

Mr. ROGERS of Texas. I thank the gentleman.

Mr. JONAS. Mr. Chairman, will the gentleman yield?

Mr. ROGERS of Texas. I yield to the gentleman from North Carolina.

Mr. JONAS. I notice that the program described in section 101(a) is a 10-year program.

Mr. ROGERS of Texas. Yes, sir.

Mr. JONAS. But I do not note any limitation on the authorization provided in section 100(a). Is it the idea of the committee that that would be a permanent authorization?

Mr. ROGERS of Texas. Does the gentleman mean 200(a)?

Mr. JONAS. 100(a).

Mr. ASPINALL. Mr. Chairman, will the gentleman yield?

Mr. ROGERS of Texas. I am pleased to yield to the distinguished chairman of the committee.

Mr. ASPINALL. Page 12 authorizes appropriations only for the beginning with a lesser amount and going up to the amount permitted in the 4th, 5th, 6th, 7th, 8th, 9th, and 10th year.

Mr. JONAS. That is on page 14?

Mr. ASPINALL. That is on page 12 of the bill.

Mr. JONAS. On what line is that?

Mr. ASPINALL. That is on line 11. In line 13 there is an authorization of appropriation to the Secretary of the Interior for the fiscal year 1965 and so on.

Mr. JONAS. Is this the same limitation that is contained in section 101(a)?

Mr. ASPINALL. The 10-year period, yes.

Mr. MATTHEWS. Mr. Chairman, will the gentleman yield?

Mr. ROGERS of Texas. I am pleased to yield to the distinguished gentleman from Florida.

(Mr. MATTHEWS asked and was given permission to revise and extend his remarks.)

Mr. MATTHEWS. Mr. Chairman, I rise in support of this important legislation which, if enacted into law, would establish water resources research centers at land-grant colleges and State universities, to stimulate water research at other colleges, universities and centers of competence, and to promote a more adequate national program of water research.

I want to thank the Committee on Interior and Insular Affairs for giving me a hearing on this legislation. I introduced in the House a companion bill to S. 2, but as I pointed out in my appearance before the committee, I was not insisting on the approval of S. 2 to the dotting of an "i" and the crossing of a "t." This great Committee on Interior

and Insular Affairs of the House has worked its will, and you will note has reported S. 2 with amendments, and I concur in the action that they have taken.

Mr. Chairman, I represent an area in Florida in which is located the University of Florida, at Gainesville. The president of that great institution, Dr. J. Wayne Reitz, appeared before the Senate committee in favor of this type of legislation. He has talked with me in detail about the importance of this type of legislation for Florida. It is my understanding that the National Association of Land-Grant Colleges has approved this type of legislation, and I appreciate the information that they have given me concerning the importance of our water resources.

Some years ago as a member of the House Committee on Agriculture, I went to the far western part of this Nation into the home country of the chairman of this great Committee on Interior and Insular Affairs. For the first time, I realized how important the conservation of snow was. I found out there the problem was getting the water and holding it, whereas our problem in Florida is not so much to get the water, but to hold it once we get it, and to make arrangements for it to find its last resting place without irreparable damage to the topography of Florida.

In Florida, our problems are different from the problems in Colorado, Texas, or California, or any of the other great States in the Union. We have at Silver Springs, Fla., in the congressional district of my able colleague, the gentleman from Florida [Mr. HERLONG], magnificent springs that have a daily outflow which would just about take care of the water needs of the city of New York. And, over in the Suwannee River area in Florida, half of which is in my district and the other half in the district of my able colleague, the gentleman from Florida [Mr. FUQUA] we have an almost unbelievable water resource. This beautiful stream rises in the Okefenokee Swamp in Georgia, and meanders its way in a veritable fairyland of fauna down into the Gulf of Mexico. It is fed by myriad streams—beautiful, soothing, clear streams.

The interesting fact is that water in both Silver Springs, Fla., and the water in the Suwannee River, find their last resting place in the Gulf of Mexico and the Atlantic Ocean. So perhaps that water is wasted, and someday we might find a way to use this magnificent resource.

We have problems with the replenishment of the aquifers in Florida. Quite frequently, without much rainfall in Florida, our underground streams are replenished because of the peculiar system of replenishing these aquifers. I understand the replenishment comes from as far away as North Carolina.

Now, the first title of the bill, title I, authorizes State water resources research institutes at a college or university in the particular State, which college or university shall, unless otherwise provided by act of the legislature of the State concerned, be a land-grant college

or university. I think this approach is a good approach. The University of Florida, my alma mater, and a great institution as I have said, located in my congressional district, is a land-grant college. For 10 summers of my life, I worked with the Extension Service at the University of Florida, so I am familiar with the research work that has been done by that university and other land-grant universities and colleges throughout the country in the area of water research. Title I makes possible the work of this research through a water resources research center at a land-grant college. Now, of course, it is not the purpose of this legislation to dictate to the State agency all of the particulars of the establishment of the research institute or center, but I think it is the purpose of this legislation to suggest that these centers should be established at places that have developed areas of competence. I feel that many of our people connected with the experiment stations of agriculture and engineering at the University of Florida have developed competence in the field of water research. I think if this legislation is passed, as I believe it will be, that the program should seek the institution and not the institution the program. I feel that we should give priority to areas where competence in water research—if not already a proven fact has demonstrated the possibility of gaining that competence in the very near future.

The program in title I is patterned after the Hatch Act of 1887. It is not a new type of approach for Federal aid to education. It is based on an approach that has proved to be successful. As a member of the House Committee on Agriculture, I have been impressed with the far-reaching beneficial results of the Hatch Act of 1887. Largely, I think, because of that legislation we have in America today a great agricultural abundance. One farmer in America can produce enough for 27 other people. Productivity on American farms of certain commodities could be increased 25 percent in 2 years if we wanted to make a tremendous effort toward that end. This is a result, let me repeat again, largely, I think, of the Hatch Act of 1887.

The bill provides for the printing and publishing results thereof; and for administrative planning and direction. In section 104, the Secretary of the Interior is charged with the responsibility for the proper administration of this act, and the Secretary is directed to make an annual report to Congress of the receipts and expenditures and work of the institutes in all States under the provisions of this act.

Title II of the bill provides for the cooperation and coordination of all agencies of the Federal Government concerned with water problems. Particular stress is given to the importance of supplementing, and not duplicating, established water research programs. I think this is a very important aspect of the legislation. It is my understanding this year there are presently 5 departments and 3 separate agencies, with a total of some 23 different agencies, conducting

water resources research in connection with their authorized missions. Approximately \$76 million has been appropriated this year for water research activities, and the amounts requested for water research are increasing every year. We must, then, avoid duplication and we must be sure that the water research provided for in this legislation is not a duplication of the important work that is already being done.

Another very important aspect of this legislation, Mr. Chairman, is outlined in section 204 of title II, as follows:

There shall be established in such agency and location as the President determines to be desirable, a center for cataloging current and projected scientific research in all fields of water resources.

The cataloging center is absolutely essential. I believe that at the present time there is no adequate provision for compiling the vast amount of water research that is being done. Certainly it is basic, if we avoid a duplication, that we have this cataloging center.

Mr. Chairman, I realize that this legislation will cost money. In this particular bill, sufficient funds are authorized to be appropriated so that each research center would receive a Federal grant of \$75,000 in the first year of the program, \$87,500 in the second and third years, and \$100,000 thereafter for the life of the program. Additional funds would be available to the research centers on a dollar-for-dollar matching basis. These funds would be allocated by the Secretary of the Interior on the basis of specific research proposals by the research centers. The overall limitation on these matching funds would be \$1 million in the first year of the program, increasing to \$5 million in the fifth year, and thereafter for the life of the program. The legislation limits the life of the program to 10 years, which I think is very desirable, in order to give the Congress an opportunity to review the program and determine the need for extension, modifications, and so forth. I believe we are justified in spending this money because of the necessity of conserving our water resources.

Let me emphasize, for example, the need for research on the use of Florida's water resources: Florida is richly endowed with water resources—resources that have enabled a rapidly growing population to expand its residential, commercial, industrial, and recreational facilities and at the same time raise its per capita income to an all-time high. With only a modest investment in research on water and facilities for making them more useful, these same resources are more than ample to sustain the State's current rate of economic growth for decades to come. On the other hand, if the investment is not made now, water shortages will begin to restrict economic activities at any early date, and the cost of developing new sources of water will rise very rapidly.

Before the State's water resources can be effectively managed, the whole problem of retaining as much rainfall as possible in the soil, in the aquifers, and in the lakes and then making it available at the time and place that people can use

it must be thoroughly examined. Studies of how to recharge the Floridian aquifer as rapidly as water is being withdrawn from it are urgently needed. Some of this kind of research is now being done in Green Swamp area, but it must be expanded and extended to all other parts of the State as soon as possible. Likewise, there is an urgent need for research on how to store the optimum amount of water in the State's vast natural surface water storage system—its lakes and streams—and to determine what additional water storage and transportation facilities are needed. Some facilities designed to achieve this end are now being constructed by the central and southern Florida flood control district but much more must be done if the population of the State continues to grow. To date only a very small portion of the research that must be done before the surface and underground water supply of the State can be fully utilized has even been outlined, let alone started, primarily because research funds have not been available.

Along with research on how to make water available at the time and place people can use it, research must be initiated on how to control the destructive floods that so frequently accompany hurricanes during the rainy seasons. Floodwaters can be and in fact have been effectively removed by ditches and canals, but the longrun effects of doing this are often most disastrous. The same facilities that remove floodwaters rapidly also reduce the water table and intensify the effects of droughts just as rapidly. In other words, overdrainage can have a most detrimental effect on citrus, vegetable, and cattle production in many areas in which the amount of water returned to the atmosphere in the form of evaporation and transpiration exceeds the amount received in the form of rain for from 3 to 9 months per year. By developing a means of controlling floods that is complementary rather than conflicting with a sound water management program, the economic potential of the State can be greatly enhanced.

More research is also needed on how to best utilize the large volumes of water that flow through rivers that originate in other States, pass through Florida, and discharge into the ocean and gulf. The Southeastern River Basin Committee is hard at work on this problem, but the implications of its findings and recommendations have not yet been carefully examined and evaluated, largely because of the lack of research funds.

An investment in research in Florida's water resources at the present time is essentially an investment in the State's future economic development. The most desirable environment in which to make such an investment is in Florida's land-grant university, where all phases of engineering, agriculture, forestry, law, medicine, and business, as well as the basic sciences, are being studied at the graduate level, and hence, where the scholars best qualified to do the job are located.

So, Mr. Chairman, let me say again that I am in favor of this legislation. I want to thank the House Committee on

Interior and Insular Affairs for submitting this important legislation to us, and I hope the House will overwhelmingly approve this legislation.

Mr. ROGERS of Texas. Mr. Chairman, I thank the gentleman from Florida and would like to say that his contribution in this field has been measurable and his testimony before the subcommittee was most helpful.

Mr. TAFT. Mr. Chairman, will the gentleman yield?

Mr. ROGERS of Texas. I yield to the gentleman from Ohio.

Mr. TAFT. Mr. Chairman, I note on page 17 of the bill that it is provided that the Secretary of the Interior is charged with the responsibility for administration of the act and that after full consultation with other interested Federal agencies is empowered to prescribe such rules and regulations as may be necessary to carry out its provisions. I would like to ask the gentleman what kind of rules and regulations we are talking about here? Can he tell us whether the Secretary could put conditions upon the administration of the State water laws or State programs of various other kinds, before granting the assistance which is provided for under this bill, to the State universities involved?

Mr. ROGERS of Texas. The question as to the extent of the power that the Secretary of the Department of the Interior would have was discussed in the subcommittee. It was the feeling of the subcommittee—and I certainly want it to be known that it was my feeling as chairman of that subcommittee—that the authorization to the Secretary of the Department of the Interior is for the purpose of enabling him to properly administer this law.

Provision is made for applications to be filed so that the Secretary of the Department of the Interior may look at them to determine whether or not effective research is anticipated by the particular organization.

It is not anticipated that the Secretary of the Department of the Interior could change the laws or resort to any subterfuge or circumvention of general reasonable policy in denying a State funds under this act.

I hope that if any university or any land-grant college or any school which is subsequently included in the program if this act is passed becomes even suspicious that this were going on, it would immediately report it to the Congress. This proposed act provides for the Secretary of the Department of the Interior to make an annual report to the Congress so that we may know from year to year what is going on, not only with respect to the expenditure of the funds but as to the research that has been accomplished.

Mr. TAFT. If the gentleman will yield further, would it be fair to say then that the rules and regulations that are referred to in this particular section that I have mentioned, section 104, relate not only to procedures, but they also go beyond procedures and relate to a control given to the Secretary of the Department of the Interior to control the field of

research activity that would be carried on under the act.

Mr. ROGERS of Texas. I believe that he possibly could to some extent have indirect control over the type research that is carried out. But the Secretary of the Department of the Interior is under the obligation—because we have put in the cataloging provision and the coordination provision—to justify the manner in which he has administered this program to the Congress of the United States each year. The Congress itself can, of course, step in and put a stop to any abuses that might be indulged in by the Secretary of the Department of the Interior in carrying out the provisions of this act. I can appreciate the fact—and I am sure that the gentleman from Ohio can—that there is a possibility of abuse in any legislation. However, I believe we have here, through the requirement of the reports to be filed by the Secretary of the Department of the Interior, made it possible for the Congress to step in at any time during the year or immediately after the end of the year and make whatever changes are necessary.

Mr. TAFT. If the gentleman will yield further, that of course would be true of the administration of any Federal program under any grant or loan such as this. Congress always retains the power under the Constitution to step in. So we are talking about nothing more than the constitutional power of the Congress to control the laws of the United States.

Mr. ROGERS of Texas. Permit me to say this to the gentleman: I have some examples wherein I believe some of the Departments have gone far beyond the constitutional inhibition about which the gentleman from Ohio is talking. I have constantly fought against the invasion of the legislative prerogatives by Departments downtown. That is one of the things we were trying to point up in the hearings on this bill, that we did not want that to be done.

Mr. TAFT. If the gentleman will yield further, it is my own personal feeling that the proper place to put the limitation in it and to say what we mean as to what is to be done, is when the law is first passed and not after there have been some abuses.

Mr. Chairman, I thank the gentleman for yielding.

Mr. ROGERS of Texas. I thank the gentleman from Ohio for his contribution.

Mr. SAYLOR. Mr. Chairman, I yield 5 minutes to the gentleman from Wisconsin [Mr. LAIRD].

Mr. LAIRD. Mr. Chairman, I ask unanimous consent to proceed out of order.

The CHAIRMAN. Is there objection to the request of the gentleman from Wisconsin?

There was no objection.

Mr. LAIRD. Mr. Chairman, bipartisanship in foreign policy is a fine thing, but if we are going to have any kind of true bipartisanship we must have common understanding and respect between the majority and minority parties in this country.

Today the President at his news conference, I believe, misled the American

people. At that particular news conference the President was asked about a statement I made in answer to a question on a radio program which was broadcast on Sunday last. The answer to a question which was asked at that time was based on information supplied to me by the Secretary of State. Secretary of State Rusk informed me in connection with my work as chairman of the Republican platform committee for 1964 that the U.S. policy was to take whatever steps may be necessary to protect southeast Asia from a Communist takeover.

I was further informed that all contingency plans are being made to carry out this policy decision of the administration. The contingency planning includes the preparation of plans to go north into North Vietnam to hit at the heart of the problem as far as South Vietnam and Laos are concerned.

In my radio interview, in answer to a particular question, I made it perfectly clear that the decision had been made to prepare these plans but that no decision had been made to implement these plans in any way. The United Press and the Associated Press quoted this interview absolutely correctly. The Associated Press even carried the word "prepare" in italic.

The President was asked about the preparation of such plans as referred to by me in his press conference today. I was supporting the Johnson administration in my comments on Sunday. I did not use any of the classified testimony before our Defense Appropriations Committee in this connection at any time. The Secretary of Defense appeared before our committee and any member of our committee will give you, I am sure, complete substantiation of the basic nonclassified information which I used. We are making plans and preparing plans for this particular contingency. We should be and I commend the State Department and Department of Defense for this planning. But when the President was asked about this at his news conference, he said, and I quote the United Press story:

Johnson at first dismissed this by saying LAIRD—who is chairman of the Republican platform committee this year—is not yet speaking for the administration.

But when a newsman pressed the question whether there were in preparation contingency plans for taking the war to North Vietnam, President Johnson said, "I know of no plans being made to that effect." That simply is not the case. We have contingency plans in this particular area, and we should not advise the potential enemy in advance that we have no such plans. This is very bad national strategy as far as the United States of America is concerned.

If I were at liberty to release the testimony by the Secretary of Defense before the Defense Appropriations Committee in the past 2 weeks, it would show this is certainly not his position. He supports the position and firm statements of Secretary Rusk. I regret that the President of the United States used his news conference in this way, because the American people deserve to be informed and have the right to know.

Our potential enemy should not underestimate the will and determination of our country.

Mr. SAYLOR. Mr. Chairman, I yield 8 minutes to the gentleman from Connecticut [Mr. DADDARIO].

(Mr. DADDARIO asked and was given permission to revise and extend his remarks.)

Mr. DADDARIO. Mr. Chairman, I support the bill which the Committee on Interior and Insular Affairs has before us, but I do believe that section 203 is subject to amendment.

I will offer an amendment to section 203 of the bill.

This section is a highly restrictive one. It deals in peremptory fashion with a very complex subject—patent ownership. It was not in the bill as requested by the administration. It is objected to by the Bureau of the Budget. It found its way into the bill by last-minute amendment on the Senate floor, with no significant discussion. I feel it should be amended.

Section 203 is the latest in a long series of efforts to force Federal administrators to impose patent restrictions on private organizations and individuals doing research and development for the Government—restrictions largely repugnant to those doing the work, on whom the Government must depend for progress. In essence it provides that all property rights developed through research sponsored under the bill shall fall in the public domain—regardless of the extent of the contribution made by the party doing the research.

Mr. Chairman, this section involves a controversy of long standing over Federal ownership of patents. For the most part the Senate, in recent years, has tended to favor Government title to patents arising in the course of research done with Federal funds. The House has taken the more liberal stand that title should be the result of a fair appraisal of all the equities involved—going, at times, to the Government and, at other times, remaining in the contractor subject in all cases to a license in the Government to use the invention developed royalty-free.

It has been the history of the House generally to reject language such as contained in section 203, the most recent example being the Clean Air Act, H.R. 6518, on which final action was taken December 10, 1963. At that time I commended the managers on the part of the House for their efforts and particularly for seeing that restrictive language, with respect to patents and other proprietary rights, was eliminated from the bill.

The issue is not a simple one. Years of study have gone into its attempted solution, and even yet there is no generally accepted one. To treat the matter as contemplated in section 203 is grossly unfair to both the Government and the private contractor or individual.

I would remind my colleagues that the patent right is a constitutional one. It was developed in the Constitution, not as a special franchise to the entrepreneur, but as a device to insure the promotion of the arts and sciences. It recognized human nature and the value of personal ownership—not alone to the individual, but to the public as well.

I would further point out that in recent years many of the nations of the world which have followed the route of socialization of industry and agriculture have discovered—belatedly—what our Founding Fathers knew all the time: that the man with a personal stake in his work does a better job for his contractor. Thus, one by one, these countries, including England, France, Germany, Italy, et cetera, and even the Soviet Union, have lately been casting about for means of giving greater rewards and incentive to individual inventors. Ironically, some of them now give their contractors a better break patentwise than does the United States. They have learned that to compete in today's consumer market, this kind of incentive is essential. Those of us who watch the balance-of-payments situation are only too painfully aware of how effective their competition has become.

Mr. Chairman, the Government versus private ownership of patents problem is not static. Much progress has been made in the past decade and real milestones passed.

The hearings which our own Subcommittee on Patents and Scientific Inventions conducted over a 4-year period did much, I believe, to dispel many of the misconceptions surrounding this matter. The excellent studies conducted by the Patents Subcommittee of the Senate Judiciary Committee were also invaluable as a source of factual material. The extended debate in the House on the Government ownership problem relative to amendments of the Space Act, in 1960, crystallized the issues. Since then, new flexibility instituted by NASA and the AEC relative to their patent policies, together with a reassessment of defense policies, has brought about a trend away from extremes. The 2-year extensive study by executive agency heads, which culminated in a moderate position by the Federal Council for Science and Technology—and eventually the statement of patent policy enunciated by President Kennedy last October—now seems to have created a stabilized, commonsense rationale for the administration of Federal policy until such time as a better one may be developed.

The basic theme of the administration policy is contained in this comment from the memorandum promulgating the new policy, October 10, 1963:

This statement of policy seeks to protect the public interest by encouraging the Government to acquire the principal rights to inventions in situations where the nature of the work to be undertaken or the Government's past investment in the field of work favors full public access to resulting inventions. On the other hand, the policy recognizes that the public interest might also be served by according exclusive commercial rights to the contractor in situations where the contractor has an established nongovernmental commercial position and where there is greater likelihood that the invention would be worked and put into civilian use than would be the case if the invention were made more freely available.

The statement then undertakes to spell out guidelines designed to assist Federal administrators in making their determination of where proprietary rights should properly vest.

Thus the present policy, which is controlling except where specific statutes provide otherwise, assures protection of the public from the antitrust point of view, while seeking to guarantee contractors that their efforts will be rewarded in proper ratio to their contribution to the research undertaken.

Mr. Chairman, when legislation contains a provision such as section 203 of this act, then the head of the Government agency involved cannot comply with the President's carefully formulated policy.

It is in this regard that I call your attention to the letter of February 20, 1964, to the chairman of the Interior Committee from the Assistant Director for Legislative Reference, Bureau of the Budget, Mr. Phillip S. Hughes, recommending the deletion of section 203. After reference to the Presidential statement on Government patent policy, Mr. Hughes states:

As reported by your committee, the pertinent provisions of section 203 of S. 2 would not permit this flexibility but would instead have the effect of denying patent rights to those conducting research in all cases. In our judgment, the provisions of section 203 relating to patents would inhibit the desirable flexibility of the administration's policy with respect to patent rights and we, therefore, recommend the deletion of those provisions from S. 2.

Mr. Chairman, I do not wish to belabor the point.

I would only call your attention to the fact that the bill calls upon the great land-grant universities or such other colleges as the individual States may designate to perform the required research into solving our water problems. Yet many of these colleges and universities—according to a National Academy of Sciences study conducted by Dr. Archie M. Palmer in 1962—follow established patent policies which would have to be violated if section 203 remains in this bill. Surely, this is not the way to get the job done.

I think it is entirely possible that one day in the future we will end up legislating overall Government patent policy. But to do this by statute will require much more study by the appropriate congressional committees in collaboration with executive agencies, the patent bar and private contractors—and after we have had more experience with the existing policy statement. In the meantime we should not, in a piecemeal manner, undermine and corrupt that carefully designed policy as section 203 would do. We should give it a chance to work.

Please note that the administration policy sets up a procedure for its own review and revision as experience dictates the need. A patent advisory council is set up under the Federal Council for Science and Technology to develop further guidelines for the implementation of the policy. The panel was set up early this year by the Johnson administration and is now actively functioning. It is chaired by Dr. William Eaton, Deputy Assistant Secretary of Commerce, and has representatives from 21 agencies. Under the panel, subcommittees have been formed and are in active operation for planning university grants and contracts, reports, foreign patent management, domestic patent management, and

data collection and analysis. More than 40 senior policy-level administrators are involved with the actions of the panel and the subcommittees.

Mr. ROGERS of Texas. Mr. Chairman, I yield to the gentleman from Hawaii [Mr. GILL].

(Mr. GILL asked and was given permission to revise and extend his remarks.)

Mr. GILL. Mr. Chairman, I rise in support of this measure. The House Committee on Interior and Insular Affairs has given long and careful consideration to the objectives of this bill, and modified it to provide maximum effectiveness to the immediate program.

The appropriation of \$75,000 to each of the State institutions involved during fiscal 1965, \$87,500 for the next 2 years, and \$100,000 for each year thereafter up to the 10th year will allow the land-grant colleges or other designated institutions in the various States to establish teaching and research facilities. These facilities and the personnel attached to them can serve as the nucleus for training young scientists and technicians in the field of water resources.

In addition, the Secretary of Interior can make further money available, on a one to one matching basis, for specific water research projects at these institutions.

This can well be termed a "seed" program in an area which daily grows more vital to our people. Our rapidly rising population, falling water tables, increased pollution of existing supplies, and tremendous new uses for water all combine to make knowledge of this life source more critical each day. Strangely, we have long taken water for granted; our scientific effort and our fund of knowledge in this commonplace subject has been minimal, compared to advances in more spectacular areas.

It serves us little to spend billions to put a man on the barren reaches of the moon or to clutter space with satellites and rockets, if our farms and cities wither for the lack of adequate water. With this initial program we should be able to attract some of our abler young people into a field of endeavor and study which will always be basic to life itself.

In Hawaii we have been blessed with relatively abundant water for our large urban centers, and we have long been concerned with developing water for agriculture and our barren areas. But as our population grows in Honolulu our need to understand the precise function of our aquifers, to control pollution, and to allow multiple use and breathing space for our people in some watershed areas becomes ever more intense. This bill should allow the University of Hawaii to make a start at a long-range water research section, help coordinate current research, and supply new technicians this problem will require in the years ahead.

Mr. ROGERS of Texas. Mr. Chairman, I yield to the gentleman from Idaho [Mr. WHITE].

(Mr. WHITE asked and was given permission to revise and extend his remarks.)

Mr. WHITE. Mr. Chairman, as a member of the subcommittee which held

hearings on S. 2 and reported it, I want to commend Chairman ROGERS and chairman of the full committee WAYNE ASPINALL for the excellent legislation we are considering today. The Water Resources Research Centers Act of 1964 has been in the making for some time and its passage this year is imperative. The bill will provide the necessary funds and coordinating facilities for research which to this point has been minimal and quite unrelated. The research contemplated in S. 2 will find immediate application in the critical water resource problems facing the Nation today.

In my own State of Idaho there is a great deal of interest in water resources but the lack of funds for geological, physical, legal, and hydrological studies have kept activity at quite a low level. S. 2 would provide the tools for achieving goals in water research which we have desired for some time. For example, there is a great need for an inventory of our underground water resources because this source may be depleted without our actual knowledge if there is no accounting for the supply. Our university has devoted much time, money and energy to this and other water questions but the lack of adequate funds has limited the scope of this work. The need is critical and the legislation proposed in S. 2 reasonably and thoroughly meets this need.

Changes adopted by the House Interior Committee are, I believe, great improvements over the original language of S. 2. Allocation of the funds to State universities gives the direction toward local water problems. Language adopted by the committee which directs the President to establish a cataloging center lays the groundwork for proper coordination of the information and the research gained at the local levels. The 10-year limitation will make it incumbent on us to evaluate the returns on our funds within a relatively short period of time. It is quite likely that at the end of this period that new directions in water resource research activities will become necessary. I believe we are starting right with enactment of the House Interior Committee version of S. 2 and I believe the legislation provides that we will end right. I urge all Members to favorably consider this fine bill.

Mr. ROGERS of Texas. Mr. Chairman, I yield to the gentleman from Georgia [Mr. WELTNER].

(Mr. WELTNER asked and was given permission to revise and extend his remarks.)

Mr. WELTNER. Mr. Chairman, I am proud to support S. 2, a bill to establish water resources research centers. My region of the country, the great Southeast, has long been aware of the need for conservation and development of water resources. This is a necessity if we are to meet the growing needs of a dynamic economy and an expanding population.

Georgia has led the way in the Southeast in approaching the problems toward which this legislation is directed.

In July 1963, the board of regents of the University System of Georgia established the Water Resources Center at the

Georgia Institute of Technology, in my congressional district. The purpose of this center is to stimulate a broadly based, comprehensive program in water resources education and research.

The director of that center is Prof. Carl E. Kindsvater, a nationally recognized leader in his field.

The center at Georgia Tech, with its outstanding research facilities and staff, places it in position to take immediate advantage of this legislation. While the amount of Federal funds available to each State under the act will be modest, I believe its ultimate effect will be the establishment of a national network of water research centers. Their potential will be, I am confident, equal to national needs. I urge the passage of this bill.

Mr. ROGERS of Texas. Mr. Chairman, I yield the remainder of my time to my colleague from Texas [Mr. PICKLE].

(Mr. PICKLE asked and was given permission to revise and extend his remarks.)

Mr. PICKLE. Mr. Chairman, I support this measure and wish to commend the committee and its able chairman for their effective work in bringing out this bill.

There is no more important problem facing this Nation—and the world—than the guarantee of enough water for the future. As a nation we probably can handle in future years matters affecting space, room, shelter, and oxygen, but problems in the field of water and water supply looms as the greatest threat to our survival than any other resource. We must prepare now for this supply of water. There is no better place than to start intensive research and study at our State universities and colleges, coordinated with our Federal Government.

However, each State ought to be given the greatest leeway in carrying out this research. Each State ought to know best where this research is to be accomplished, based on the present water study programs, the potential of research in each institution, and the water plans already formulated within a State. I am concerned that the language in the present bill is too restrictive in that grants might automatically go to a land-grant college rather than the appropriate university or college in the State which might be better or as equally equipped to handle the research.

I am sure all of us agree that the research grants should not be divided between more than one or two schools and that the research should go to the school best equipped to carry out the aims of the Congress. I am fearful that unless we change some of the language in this measure, some of the grants might go to schools which have a small or inadequate program underway—with little potential for development—rather than to a school which has already specialized in this field. I am hopeful that the committee will make the language general in nature—giving each State the free authority to designate—instead of the grants going to land-grant schools alone.

Now I realize the present language says that the grant would go to land-grant schools—unless otherwise directed by

the legislature of a respective State—but that means that the only way any other school might get one of these grants is perhaps to have a knock-down, drag-out fight with the legislature.

I would think that the bill would be much more effective if the Governor, advised by the proper water resources authority of the State, or the State water resources authority itself, could determine what institution would receive the research funds. This would have the twofold purpose of, first, more quickly expediting the matter, rather than waiting for the State legislature to convene—and perhaps becoming bogged down in an intramural battle of college alumnae politics—and, second, of allowing the agency of the State which is most nearly associated with the water problems of the State to determine which institution is best prepared to carry on the best program. This is certainly an area in which the State can best determine the needs and problems which it faces.

Rather than leave the impression that the grant must go to a land-grant school—unless otherwise designated by the legislature—I hope the committee, either in the House or at a later point—simply will say that the grants go to a respective college or university within the State as “designated by the appropriate State agency having jurisdiction over water resource matters within that State.” It may well be that many of these grants will go to land-grant colleges, and that is fine if that school is best equipped to handle the research. But other schools ought not to be pre-empted or cut off from the possibility of conducting the research. I do not think the Congress wants to set up research projects where it is least effective. It ought to be done where it can be the most effective.

There are a number of water resources centers established and working throughout the country at this very moment. One of these is at the University of Texas, under the very able direction of Dr. Earnest Gloyna and many of the departments at the university—ranging from the department of engineering to the school of law. Heretofore, all of these departments carried on separate teaching and research operations. It was deemed a necessity that there must be a central mode of operation and coordination to insure that efforts of our various experts are channeled toward common solution of water research problems.

The University of Texas' Center for Research in Water Resources has been a going concern for nearly 2 years. It has incorporated the best of all departments at the university and has at its command some of the leading experts in the various areas of water problems. Its scope ranges from hydraulics and fluid mechanics in the department of engineering to water law at the school of law. Under the superstructure of the research center all of these various department's research would be coordinated to map out a completed picture of the water situation in the State of Texas. As far as the necessary facilities are concerned, the area surrounding Aus-

tin is ideal because it is the location of the University of Texas, and a series of lakes and dams on the Colorado River, and watersheds. These teams of researchers can, with easy accessibility, draw the necessary information to formulate a complete picture of our water problems. And this is not an educational institution scheme alone. Private business concerns are participating now—in time and money—and are being encouraged to participate in order that the whole economy and well-being of the State can be fully met. In fact, I have received letters from several civic minded groups, praising the work and foresightedness of Dr. Gloyna and the University of Texas in meeting the challenge of this vital problem.

Therefore, I think it is essential that this university and the others throughout the country be given a partnership in the development of this Federal program. Title I of the House version of the bill would tend to discriminate—even though perhaps unintentionally—against many well established universities which are leaders in water resources research. I think it would be a waste of manpower resources not to stimulate the use of existing facilities. Therefore, I favor this measure but hope its language be broadened.

Mr. EDMONDSON. Mr. Chairman, will the gentleman yield?

Mr. PICKLE. I yield to the gentleman from Oklahoma.

Mr. EDMONDSON. I thank the gentleman for yielding. I congratulate him for his fine presentation. As one of the cosponsors of this legislation, I join him in urging its adoption as a most needed part of the President's long-range approach to the water problems of the United States. The water research centers authorized by this bill will contribute substantially to the solution of those problems throughout the Nation.

Mr. PICKLE. I thank the gentleman from Oklahoma.

Mr. SAYLOR. Mr. Chairman, I yield such time as he may consume to the gentleman from Massachusetts [Mr. CONTE].

(Mr. CONTE asked and was given permission to revise and extend his remarks.)

Mr. CONTE. Mr. Chairman, I strongly urge the passage of this most worthwhile piece of legislation.

Mr. Chairman, the legislation before the House this afternoon is absolutely essential if this Nation is to have a coordinated national program of water research.

In the Commonwealth of Massachusetts, we have an outstanding land-grant college at Amherst, Mass.—the developing, progressive University of Massachusetts.

This outstanding school is well equipped physically and intellectually to continue a program of water research. This institution has managed to chart an enviable record in related research areas and the passage of this legislation will further insure their continued expansion in an area of vital concern to the citizens of this Nation.

This program—and I want to take this opportunity to congratulate the gentlemen from Texas [Mr. ROGERS]—will go a long way toward strengthening the contribution that universities can make to water resources and related forms of research.

With the projected growth of our population, there is an increasing need for studies of this kind, and the University of Massachusetts will need the funds to cope with mounting water-use programs caused not only by the population boom but also by an increasing industrial society.

The program would assist both the water programs at the local and State level and in meeting the critical needs of furnishing additional hydroscintists.

The water research needs of this Nation to have a center located in each State were brought out very forcefully by the Senate Select Committee on Water Resources in the report of January 1961.

Here were some of the areas—reducing evaporation from the surface of reservoirs, elimination of water-loving vegetation along the edges of watercourses and reservoirs, reducing seepage losses in irrigation canals and other water distribution systems and other wasteful practices—as well as other projects too numerous to mention at this time.

Mr. Chairman, I agree with the committee when it states that a great contribution can be made at the State level because of the differences each State faces. This is an essential point.

The funds involved—\$75,000 for the first year, \$87,500 in the second and third years, and \$100,000 each year thereafter until Congress reviews the program—would establish the finest network of centers across the land and meet face on the problems that will continue to arise.

I know that the University of Massachusetts—already on the verge of major breakthroughs in the area of research—will greatly benefit from the program.

All of Massachusetts would gain from this program, Mr. Chairman. It is also obvious that the entire Nation would receive untold advantages from the program during the next 10 years.

I urge the immediate enactment of this bill to establish these centers. As the first House sponsor during the 1st session of the 88th Congress to set up a northeastern water resources compact and similar legislation, I feel that the present bill is a must and one that should be enacted.

(Mr. CLEVELAND (at the request of Mr. SAYLOR) was given permission to extend his remarks at this point in the RECORD.)

Mr. CLEVELAND. Mr. Chairman, I rise in support of this legislation establishing water resources research centers at land-grant colleges and State universities to promote thereby a more adequate national program of water research.

The University of New Hampshire, in my State, has already undertaken plans to utilize the grants provided for by this legislation. The need is great in New Hampshire for localized research to cope with mounting water use problems

caused by the increase in our population and the growth of our economy.

New Hampshire's economy typifies the need for localized research. We have of course an increasing industrial and population need for water. We also enjoy matchless recreational facilities that support an important segment of our economy on a year-round basis which depend on water. In addition, agriculture and forestry are large and important segments of New Hampshire's economy and they also depend on water. The University of New Hampshire will be cognizant of the conflicting demands and needs of the different segments of our diverse economy. Its water research efforts will thus be better motivated and more meaningful.

In establishing a water resource research center, the University of New Hampshire will be entitled to a Federal grant of \$75,000 during the first year of the program, \$87,500 during the second and third years, and \$100,000 for each of the remaining years of the program. Additional funds will be available to New Hampshire subject to approval by the Secretary of the Interior on a dollar-for-dollar matching basis for specific research proposals made by the State research center. The equal treatment afforded the several States is commendable. The matching funds can be used to reward the most promising research and serve as additional incentive.

(Mr. ELLSWORTH (at the request of Mr. SAYLOR) was given permission to extend his remarks at this point in the RECORD.)

Mr. ELLSWORTH. Mr. Chairman, the water resources research bill, S. 2, is excellent legislation. I am glad to be able to support it, and to commend and thank the great House Committee on Interior and Insular Affairs for their fine work in bringing the bill before us today.

At the same time, I regret two aspects of the present version of the bill and hope it can be modified, prior to enactment, to give more recognition to the responsibilities of the sovereign States of our Federal Republic.

I refer specifically, first, to the restrictions placed upon the ability of the States to designate non-land-grant schools as their water resources research centers or to divide this responsibility between more than one institution when such a designation or division may, in fact, be most appropriate. Secondly, I refer to the unfortunate deletion of title II of the original bill. This was the title which authorized research grants or contracts with individuals and institutions not associated with a land-grant college.

For example, we in Kansas have in full operation one of the best water resource statutes and programs in the Nation. In Kansas, the entire State-Federal cooperative ground-water investigative program is located on the campus of the University of Kansas, a non-land-grant school. Moreover, the only graduate educational program in Kansas in water engineering and water resources science is located at the university and so is all water-related research in environmental health engineering. Beyond that, the

State geological survey and the State biological survey are located at the University of Kansas, and both have Federal counterpart agencies with significant water-related responsibilities which are located in the Department of the Interior.

Recently, in order to coordinate these and the many other water-related University of Kansas functions, the Kansas State Board of Regents approved the establishment of a water resources institute.

The point is, Mr. Chairman, under the present version of S. 2 neither the State of Kansas nor the U.S. Department of the Interior would have the freedom to use these resources effectively because the University of Kansas is not a land-grant school.

Under the constitution and laws of the State of Kansas, the Governor and the board of regents have developed a magnificent water resources program in our State. We have taken great strides toward meeting our State responsibilities and we feel we have the right to ask the Federal Government to give us the freedom to continue our program in our own way, without congressional limitations and without having to go back again to our legislature.

It is my hope that S. 2 can be modified to correct these unnecessary limitations on States rights before it is signed into law.

Mr. TEAGUE of Texas. Mr. Chairman, I introduced one of the some five bills on this subject which have been pending in the House and the Senate. I do not believe that I need expound to the House the importance of this legislation. It will meet two national needs: the acceleration of research in water problems and the acceleration of the training of hydroscintists, who are desperately needed to deal with the regional and national water problems that are growing so swiftly.

It seems to me, and to almost every other reasonably well-informed person with whom I have spoken, that we cannot any longer depend upon independent, sporadic, and uncoordinated research programs if we are going to lick this problem. And lick it we must, or we shall be in dire trouble as a nation and a civilization.

The bill before us today is modeled on the Hatch Act which created the system of State agriculture experiment stations. We all know of the fine work and contributions to our way of living made by these dedicated people. The bill seeks to enlist the competence of our university faculties in needed water research work and at the same time to strengthen their work of developing and training additional new scientists and engineers. Careful attention has been given in the bill to avoiding Federal agency intrusion in or domination of the academic institutions.

As the demands for more and more water increases throughout our Nation, so do the problems of water management and pollution increase and become more complex. It is evident that education and research programs must evolve to that the scientific capability and research programs will exist to solve the

future water management problems. It is the hope of the sponsors of this legislation including myself, that this bill will answer these problems by creating the research centers which will be so badly needed in the future, and which are needed now.

Mrs. DWYER. Mr. Chairman, the pending bill, to establish water resources research centers and otherwise to stimulate more adequate water research is a modest effort to meet an increasingly urgent national problem. The committee has written a reasonable and responsible bill. The moderate costs involved should be viewed as the beginning of a vitally important insurance program which we hope will provide effective protection against future water shortages and thus pay dividends in terms of assured supplies of the most precious raw material on earth. I hope the House will approve this legislation.

Mr. SCHWENGEL. Mr. Chairman, I rise today to call attention to what I consider a couple of problems involved in this legislation.

We are authorizing what I suppose is considered a relatively small sum of money.

But, one thing we should seriously consider when we discuss expending additional sums of Federal moneys for water resources research through the facilities of educational institutions is the overall picture of water research already being conducted by Federal and State agencies as authorized by existing legislation. Another thing we should take a close look at today is the highly important need for proper coordination of activities.

The proposed water resources research expenditures for fiscal year 1965 as released by the Office of Science and Technology of the Executive Offices of the White House are some \$72½ million. Although this sum is unfortunately small in comparison to what we should be spending for water resources research if we are to meet the water problems facing this Nation, there is already duplication of research activities by the large number of Federal agencies already involved in water resources research. There are no less than 25 agencies engaged in water research, the list of which I will place in the RECORD. Their contributions range from the vastness of those made by the overall programs of the Departments of the Interior and Agriculture to those made by the research teams of the Bureau of Indian Affairs. Already deeply involved in water research are the Departments of Agriculture; Interior; Defense, Health, Education, and Welfare; the Atomic Energy Commission; the National Science Foundation; the Tennessee Valley Authority and some 25 subdivisions of those departments and agencies.

Although a close look at the possible duplication between existing and future activities of these Federal agencies may someday have to be taken by Congress, we should, as much as practically possible, insure ourselves today of not creating even more duplication of research by the passage of this act. A very large amount of money is already spent by the Federal Government through grants for

research authorized by existing legislation in fields related to water resources. Almost all State universities handle water resources research work for the respective State.

The scope of current research in water resources includes nine basic types of research concerning: the nature of water, the water cycle, water and land management, water development and control, qualitative aspects, reuse and separation, economic and institutional aspects, engineering systems, and manpower and research facilities. There are some 55 detailed aspects of those 9 areas being dealt with by the Federal agencies today. State universities under funds received under State authorizations are also conducting research in these areas.

Some interesting figures concerning expenditures on water research are as follows:

Types of research	Estimates	
	1964	1965
Nature of water.....	\$1, 770, 000	\$2, 055, 000
Water cycle.....	13, 979, 000	15, 144, 000
Water and land management.....	9, 600, 000	10, 320, 000
Development and control.....	7, 261, 000	7, 553, 000
Qualitative aspects.....	10, 731, 000	13, 329, 000
Reuse and separation.....	9, 031, 000	10, 048, 000
Economic and institutional aspects.....	2, 769, 000	2, 819, 000
Engineering systems.....	4, 980, 000	5, 573, 000
Manpower and research facilities.....	9, 352, 000	3, 423, 000

Mr. Chairman, those figures amount to \$71,473,000 in 1964 and \$72,464,000 in 1965.

Since by 1969 at the maturity of this act we would today be authorizing some 8 percent of the total revenue to be expended on water resources research at that time, we should be extremely careful not to create or allow for the creation of any duplication of activities. The outstanding contributions of State agencies should not be impeded by any section of this act which would limit the determination of the fund's direction to the political whims of State legislatures as does section 100 by the determination of State legislative action.

Most States, especially Western ones, already have competent and qualified water research teams at their State universities. In some States private schools are conducting water research activities.

This act is important but money must not be spent by the Department of the Interior merely for the sake of expending it. Careful consideration must be given to prevent duplication of activities and to insure the proper coordination of research.

DEPARTMENTS AND AGENCIES CONDUCTING
FEDERAL WATER RESOURCES RESEARCH

Department of Agriculture: Agricultural Research Service, Cooperative State Research Service, Economic Research Service, Forest Service, and Soil Conservation Service.

Department of Commerce: Bureau of Public Roads, Business and Defense Services Administration, Coast and Geodetic Survey, Maritime Administration, and Weather Bureau.

Department of Defense: Corps of Engineers.

Department of Health, Education, and Welfare: Public Health Service.

Department of the Interior: Bonneville Power Administration, Bureau of Commercial Fisheries, Bureau of Indian Affairs, Bureau of Land Management, Bureau of Mines, Bureau of Reclamation, Bureau of Sports Fisheries and Wildlife, Geological Survey, Office of Saline Water, and Park Service.

Atomic Energy Commission.

National Science Foundation.

Tennessee Valley Authority.

One other provision of this bill concerns me. The bill almost by default gives the money to the States to the land-grant colleges. I have no quarrel with land-grant schools. Many of them do excellent research in the area of water resources. However, there are many State schools which are not land-grant colleges that also do fine water resources research. These schools will not receive funds unless there is affirmative action on the part of the State legislatures. Any Member of this House who has served in a State legislature knows the problems involved in getting such action.

Let me name a few problems I envisage.

Having served in a State legislature for 10 years I know how fierce competition between State schools for funds can so easily become a political football. State legislatures have enough problems dividing up State funds without the responsibility of designating the recipient of Federal funds. Another problem concerned with the State legislature designation is that many State legislatures still meet biennially. What procedures are to be followed? Is the Department of Interior going to wait until State legislatures have met and had a chance to act or until they have completed action before giving out designations for grants?

If Interior waits, the research will be held up, if they go ahead before a State legislature has had time to act, it would be unfair to the other State schools within that State.

I would rather see the designation made by a State agency, preferably that one which has jurisdiction over water resources within a State.

This would mean State people, qualified and competent in the field of water resources would make the decision of who should do the research. Perhaps they would find that one school could best do one phase of the research and another school do another phase. I would like to see that leeway in the bill.

By placing the designation responsibility with a State agency, relatively free from political influence, one which could meet within a relatively short period of time to make a decision thereby not impeding the progress of the program, I believe we would have a superior bill.

I would hope that when this bill goes to conference, as I assume it will, the House conferees will keep these suggestions in mind.

Thank you, Mr. Chairman.

Mr. COOLEY. Mr. Chairman, the bill before us (S. 2) concerns itself with one

of the most important resource problems which will face this Nation in the years ahead—the assurance of ample and usable water supplies to meet the manifold needs of people, of industry, and of agriculture.

Authorities on this subject tell us that we are now using substantially all of our readily available water supply and that by 1980 our need for water will be double what it is today.

We who are closely associated with agriculture and directly responsible for legislation relating to programs of the Department of Agriculture have long been aware of the mounting importance of adequate water supplies to our agriculture and our economy generally.

Years ago we changed the objectives of the Soil Conservation Service from the mere prevention of erosion and the stabilization of cropland to the much broader objective of soil and water conservation. And in recent years the conservation and wise use of water has assumed a constantly more important role in our objectives.

Water conservation and the making of water facility loans have become an important part of the program of the Farmers Home Administration. Loans are available both to individual farmers to develop water supply and utilization systems for their farms and to local groups and communities for the development of community water supply and distribution facilities in rural areas.

As far back as 1951, the Committee on Agriculture became sufficiently concerned with the twin problems of water conservation and flood prevention that I sent a subcommittee headed by the gentleman from Texas, Congressman POAGE out into the Midwest to hold a series of hearings on water management.

Out of these hearings and the bill drafted by the subcommittee grew the Watershed Protection and Flood Prevention Act of 1954. This is today the basic law providing for joint community-State-Federal action for the conservation and beneficial management of our precious water supply in the area where it falls.

So I am now, and have for a long time been, deeply interested and concerned with our basic resource of water. There are still many things we need to know about this subject and in spite of all the research which is today being carried on by the Department of Agriculture and other Federal, State, and private agencies, I believe that a cooperative Federal-State research program, such as will be provided by this bill, is needed and will serve a most useful purpose.

The water research program proposed in this bill bears a close resemblance to the agricultural research program which has been carried on for many years through the State agricultural experiment stations. Like the water resources research institutes which will be established by this bill, the agricultural experiment stations are operated in conjunction with the land-grant colleges and universities. Like the experiment stations the water research institutes will combine research, teaching, and learning. Like the experiment stations, the

water research program in each State will concentrate on those problems which are of greatest importance to that State or area.

In North Carolina I hope that it will begin its studies with the problems of water pollution. Our water supplies must not only be ample, they must be free of contamination and pollution, and fit for any use that people want to make of them.

The research conducted by our State agricultural experiment stations has been a major factor in the fantastic development of American agriculture which has taken place in the past 30 years and in the tremendous increase in the productivity and efficiency of American farms.

If the research program we are establishing under this bill accomplishes half as much as has been accomplished by our Federal-State research program in agriculture we can all take satisfaction in the knowledge that we have helped to establish a very worthwhile program and one that will more than repay the expenditures made on it.

Mr. FRASER. Mr. Chairman, the University of Minnesota has a substantial education and research program in water use, as I reported to the Interior and Insular Affairs Committee when it was considering S. 2 last summer. I feel certain that the University of Minnesota could take full advantage of the provisions of S. 2 to advance the training of scientists and to conduct research.

In Minnesota water is plentiful, clean, cool. We proudly call our State the Land of 10,000 Lakes. But just as every other part of the country is finding problems with water supply, so too Minnesota must plan now to protect its water resources.

New methods must be found and new investment planned for purifying, conserving, reusing, storing, and expanding our water supply. Research cannot be handled by our State alone. We need a national system of water research centers to concentrate effort on this problem.

Minnesota's changing water needs are similar to the rest of the Nation. Use of water in the Minneapolis-St. Paul area leaped from 42 million gallons a day in 1936 to 88 million gallons a day in 1961. New industries demand more water.

Largest industrial ground water users in Minneapolis today are: First, milling; second, petroleum refining; third, malt beverages; fourth, electrical machinery; and, fifth, fabricated metal products.

Gas manufacturing, railroads, and dairy products industries were the heavy users of water 30 years ago.

Air conditioning is consuming ever greater quantities of water. Expanding population in the metropolitan area puts a strain on existing water sources.

In the next 40 years the water use in the Minneapolis-St. Paul metropolitan area will have to double to supply the needs of our growing economy.

A study by the State of Minnesota Department of Conservation spells out typical problems which need solving if we are to meet the demand for water:

Proposals have been made for returning used air-conditioning water to the aquifer from which it is pumped or to another

aquifer. The possibility of contamination, the gradual increase in temperature of the body of ground water, and certain operational difficulties encountered in recharge wells make this of doubtful value on a large scale.

Probably the greatest opportunities for effecting economies in the use of water are in industrial plants, some of which require large quantities of water for cooling, processing, boiler feed water, air conditioning, and sanitation. Each industry or plant presents an individual problem because of wide variations in such water requirements as temperature, purity, and other qualities. In some cases water which has been used once for cooling or condensing could be reused in the same plant for processing or washing; or warm water may be cooled by evaporation in cooling towers and used repeatedly for cooling. Recycling—the use of the same water repeatedly for one purpose—or its use successively for various purposes has been remarkably successful in reducing the water requirements in some industries.

A proposal is now being studied for conducting water after it has been used for air conditioning in downtown Minneapolis through storm sewers to a point from which it can be pumped directly into Minneapolis lakes to aid in maintaining lake levels or to ponding areas from which seepage will aid in recharging ground water.

S. 2 is intended to encourage expanded research in use of this vital natural resource. Coordination with existing Federal programs, use of college laboratory and teaching facilities, establishment of research centers at land-grant colleges—all these hold great promise for a water-hungry nation and new horizons of hope for regions and industries even now being limited for lack of adequate water supplies.

S. 2 can be one of the most important accomplishments of this Congress in preserving and developing our Nation's resources.

The CHAIRMAN. Pursuant to the rule, the Clerk will now read the substitute committee amendment printed in the reported bill as an original bill for the purpose of amendment.

The Clerk read as follows:

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That (a) this Act may be cited as the "Water Resources Research Act of 1964."

(b) In order to assist in assuring the Nation at all times of a supply of water sufficient in quantity and quality to meet the requirements of its expanding population, it is the purpose of the Congress, by this Act, to stimulate, sponsor, provide for, and supplement present programs for the conduct of research, investigations, experiments, and the training of scientists in the fields of water and of resources which affect water.

TITLE I—STATE WATER RESOURCES RESEARCH INSTITUTES

SEC. 100. (a) There are authorized to be appropriated to the Secretary of the Interior for the fiscal year 1965 and for each of the nine fiscal years subsequent thereto sums adequate to provide \$75,000 to each of the several States in the first year, \$87,500 in each of the second and third years, and \$100,000 each year thereafter to assist each participating State in establishing and carrying on the work of a competent and qualified water resources research institute, center, or equivalent agency (hereinafter referred to as "institute") at one college or university in that State, which college or university

shall, unless otherwise provided by act of the legislature of the State concerned, be a college or university established in accordance with the Act approved July 2, 1862 (12 Stat. 503), entitled "An Act donating public lands to the several States and territories which may provide colleges for the benefit of agriculture and the mechanic arts": Provided, That (1) if there is more than one such college or university in a State, established in accordance with said Act of July 2, 1862, funds under this Act shall, in the absence of a designation to the contrary by act of the legislature of the State, be paid to the one such college or university designated by the Governor of the State to receive the same subject to the Secretary's determination that such college or university has, or may reasonably be expected to have, the capability of doing effective work under this Act; (2) two or more States may cooperate in the designation of a single interstate or regional institute, in which event the sums assignable to all of the cooperating States shall be paid to such institute; and (3) a designated college or university may, as authorized by appropriate State authority, arrange with other colleges and universities within the State to participate in the work of the institute.

(b) It shall be the duty of each such institute to plan and conduct and/or arrange for a component or components of the college or university with which it is affiliated to conduct competent research, investigations, and experiments of either a basic or practical nature, or both, in relation to water resources and to provide for the training of scientists through such research, investigations, and experiments. Such research, investigations, experiments, and training may include, without being limited to, aspects of the hydrologic cycle; supply and demand for water; conservation and best use of available supplies of water; methods of increasing such supplies; and economic, legal, social, engineering, recreational, biological, geographic, ecological, and other aspects of water problems, having due regard to the varying conditions and needs of the respective States, to water research projects being conducted by agencies of the Federal and State Governments, the agricultural experiment stations, and others, and to avoidance of any undue displacement of scientists and engineers elsewhere engaged in water resources research.

SEC. 101. (a) There is further authorized to be appropriated to the Secretary of the Interior for the fiscal year 1965 and for the nine fiscal years thereafter sums not in excess of the following: 1965, \$1,000,000; 1966, \$2,000,000; 1967, \$3,000,000; 1968, \$4,000,000; and 1969 and each of the five succeeding years, \$5,000,000. Such moneys when appropriated, shall be available to match, on a dollar-for-dollar basis, funds made available to institutes by States or other non-Federal sources to meet the necessary expenses of specific water resources research projects which could not otherwise be undertaken, including the expenses of planning and coordinating regional water resources research projects by two or more institutes.

(b) Each application for a grant pursuant to subsection (a) of this section shall, among other things, state the nature of the project to be undertaken, the period during which it will be pursued, the qualifications of the personnel who will direct and conduct it, the importance of the project to the water economy of the Nation, the region, and the State concerned, its relation to other known research projects theretofore pursued or currently being pursued, and the extent to which it will provide opportunity for the training of water resources scientists. No grant shall be made under said subsection (a) except for a project approved by the Secretary, and all

grants shall be made upon the basis of the merit of the project, the need for the knowledge which it is expected to produce when completed, and the opportunity it provides for the training of water resources scientists.

SEC. 102. Sums available to the States under the terms of sections 100 and 101 of this Act shall be paid to their designated institutes in equal quarterly payments beginning on the 1st day of July of each fiscal year upon vouchers approved by the Secretary. Each institute shall have an officer appointed by its governing authority who shall receive and account for all funds paid under the provisions of this Act and shall make an annual report to the Secretary on or before the 1st day of September of each year, on work accomplished and the status of projects underway, together with a detailed statement of the amounts received under any of the provisions of this Act during the preceding fiscal year, and of its disbursement, on schedules prescribed by the Secretary. If any of the moneys received by the authorized receiving officer of any institute under the provisions of this Act shall by any action or contingency be found by the Secretary to have been improperly diminished, lost, or misapplied, it shall be replaced by the State concerned and until so replaced no subsequent appropriation shall be allotted or paid to any institute of such State.

SEC. 103. Moneys appropriated pursuant to this Act, in addition to being available for expenses for research, investigations, experiments, and training conducted under authority of this Act, shall also be available for printing and publishing the results thereof and for administrative planning and direction. The institutes are hereby authorized and encouraged to plan and conduct programs financed under this Act in cooperation with each other and with such other agencies and individuals as may contribute to the solution of the water problems involved, and moneys appropriated pursuant to this Act shall be available for paying the necessary expenses of planning, coordinating, and conducting such cooperative research.

SEC. 104. The Secretary of the Interior is hereby charged with the responsibility for the proper administration of this Act and, after full consultation with other interested Federal agencies, shall prescribe such rules and regulations as may be necessary to carry out its provisions. He shall require a showing that institutes designated to receive funds have, or may reasonably be expected to have, the capability of doing effective work. He shall furnish such advice and assistance as will best promote the purposes of this Act, participate in coordinating research initiated under this Act by the institutes, indicate to them such lines of inquiry as to him seem most important, and encourage and assist in the establishment and maintenance of cooperation by and between the institutes and between them and other research organizations, the United States Department of the Interior, and other Federal establishments.

On or before the 1st day of July in each year after the passage of this Act, the Secretary shall ascertain whether the requirements of section 102 have been met as to each State, whether it is entitled to receive its share of the annual appropriations for water resources research under section 100 of this Act, and the amount which it is entitled to receive.

The Secretary shall make an annual report to the Congress of the receipts and expenditures and work of the institutes in all States under the provisions of this Act. His report shall indicate whether any portion of an appropriation available for allotment to any State has been withheld and, if so, the reasons therefor.

SEC. 105. Nothing in this Act shall be construed to impair or modify the legal relation

existing between any of the colleges or universities under whose direction an institute is established and the government of the State in which it is located, and nothing in this Act shall in any way be construed to authorize Federal control or direction of education at any college or university.

TITLE II—MISCELLANEOUS PROVISIONS

SEC. 200. The Secretary of the Interior shall obtain the continuing advice and cooperation of all agencies of the Federal Government concerned with water problems, of State and local governments, and of private institutions and individuals, to assure that the programs authorized in this Act will supplement and not duplicate established water research programs, to stimulate research in otherwise neglected areas, and to contribute to a comprehensive, nationwide program of water and related resources research. He shall make generally available information and reports on projects completed, in progress, or planned under the provisions of this Act, in addition to any direct publication of information by the Institutes themselves.

SEC. 201. Nothing in this Act is intended to give or shall be construed as giving the Secretary of the Interior any authority or surveillance over water resources research conducted by any other agency of the Federal Government, or as repealing, superseding, or diminishing existing authorities or responsibilities of any agency of the Federal Government to plan and conduct, contract for, or assist in research in its areas of responsibility and concern with water resources.

SEC. 202. Contracts or other arrangements for water resources work authorized under this Act with an institute may be undertaken without regard to the provisions of section 3684 of the Revised Statutes (31 U.S.C. 529) when, in the judgment of the Secretary of the Interior, advance payments of initial expense are necessary to facilitate such work.

SEC. 203. No part of any appropriated funds may be expended pursuant to authorization given by this Act for any scientific or technological research or development activity unless such expenditure is conditioned upon provisions determined by the Secretary of the Interior, with the approval of the Attorney General, to be effective to insure that all information, uses, products, processes, patents, and other developments resulting from that activity will (with such exceptions and limitations as the Secretary may determine, after consultation with the Secretary of Defense, to be necessary in the interest of the national defense) be made freely and fully available to the general public. Nothing contained in this subsection shall deprive the owner of any background patent relating to any such activity of any rights which that owner may have under that patent.

SEC. 204. There shall be established, in such agency and location as the President determines to be desirable, a center for cataloging current and projected scientific research in all fields of water resources. Each Federal agency doing water resources research shall cooperate by providing the cataloging center with information on work underway or scheduled by it. The cataloging center shall classify and maintain for general use a catalog of water resources research and investigation projects in progress or scheduled by all Federal agencies and by such non-Federal agencies of government, colleges, universities, private institutions, firms, and individuals as voluntarily may make such information available.

SEC. 205. The President shall, by such means as he deems appropriate, clarify agency responsibilities for Federal water resources research and provide for interagency coordination of such research, including the research authorized by this Act. Such coordination shall include (a) continuing review

of the adequacy of the Government-wide program in water resources research, (b) identification and elimination of duplication and overlaps between two or more agency programs, (c) identification of technical needs in various water resources research categories, (d) recommendations with respect to allocation of technical effort among the Federal agencies, (e) review of technical manpower needs and findings concerning the technical manpower base of the program, (f) recommendations concerning management policies to improve the quality of the Government-wide research effort, and (g) actions to facilitate interagency communication at management levels.

SEC. 206. As used in this Act, the term "State" includes the Commonwealth of Puerto Rico.

Amend the title so as to read: "An Act to establish water resources research centers at land-grant colleges and State universities, to promote a more adequate national program of water research, and for other purposes."

Mr. ROGERS of Texas (interrupting the reading of the bill). Mr. Chairman, I ask unanimous consent that the further reading of the bill be dispensed with and that it be printed in the RECORD in full and it shall be open to amendment at any point.

The CHAIRMAN. Is there objection to the request of the gentleman from Texas?

There was no objection.

AMENDMENT OFFERED BY MR. ASPINALL

Mr. ASPINALL. Mr. Chairman, I offer an amendment.

The Clerk read as follows:

Amendment offered by Mr. ASPINALL: On page 15, line 18, after section 102, strike out the first sentence of section 102 and insert "Sums available to the States under the terms of sections 100 and 101 of this Act shall be paid to their designated institutes at such times and in such amounts during each fiscal year as determined by the Secretary, and upon vouchers approved by him."

Mr. ASPINALL. Mr. Chairman, this amendment was recommended by the Bureau of the Budget in its letter of March 5, 1964, subsequent to the committee's approval of the bill. We reported S. 2 to the House on February 10, 1964. The Bureau of the Budget states that this amendment is in line with its current effort to obtain greater flexibility in the timing of Federal payments under Government programs in order to insure that such payments are not made prematurely and before actually needed.

Mr. Chairman, I think the amendment is a good one and I would ask for its adoption.

The CHAIRMAN. The question is on the amendment offered by the gentleman from Colorado.

The amendment was agreed to.

AMENDMENT OFFERED BY MR. DADDARIO

Mr. DADDARIO. Mr. Chairman, I offer an amendment.

The Clerk read as follows:

Amendment offered by Mr. DADDARIO: Strike out section 203 (beginning with page 19, line 14, and ending with page 20, line 3), and insert in lieu thereof the following:

"SEC. 203. In carrying out the provisions of this Act, the Secretary of the Interior shall adhere to the Statement of Government Patent Policy which was promulgated by the President in his Memorandum of October 10, 1963 (3 CFR, 1963 Supp., p. 238)."

The CHAIRMAN. The gentleman from Connecticut is recognized for 5 minutes.

Mr. ASPINALL. Mr. Chairman, will the gentleman yield to me?

Mr. DADDARIO. Of course, I yield to the chairman of the committee, the gentleman from Colorado [Mr. ASPINALL].

Mr. ASPINALL. Mr. DADDARIO, as I understand it, this is the latest policy on the question of patents that has been promulgated by the executive department. Is that not right?

Mr. DADDARIO. That is correct. Yes.

Mr. ASPINALL. I wish that the gentleman then would answer the following questions so that we can have the record straight, and may I assure the gentleman that I intend to accept the amendment and I hope that it will be accepted by the members of the committee.

In your judgment, will the President's statement of Government patent policy assure that any information developed under the Water Resources Act will be made freely and fully available to the general public?

Mr. DADDARIO. Mr. ASPINALL, you understand, of course, that under our patent system all such information is made freely and fully available. I think the important point here is that the President's memorandum does in fact spell out guidelines through which the agency head can act so that he might determine what will be in the best interests of the Government in each instance. For example, in the President's memorandum it says, and I quote:

Another common ground of understanding is that the Government has a responsibility to foster the fullest exploitation of the inventions for the public benefit.

It then lists guidelines under which the agency head may take title and then it goes further, recognizing that there are certain exceptions where title should not be taken, allowing wider latitude so that technological progress can be advanced. It gives the agency head flexibility in the type of contract he can arrange for in the first instance and one which will be to the mutual benefit and advantage of the Government and the organizations or individuals with which it deals.

Mr. ASPINALL. Also, is it true that this is because of section 1(a) of that statement which covers cases in which, and I quote, "a principal purpose of the contract is to create, develop, or improve products, processes, or methods which are intended for commercial use by the general public or which will be required for such use by governmental regulations"?

It would naturally follow, then, your first answer to my first question is correct.

Mr. DADDARIO. I think it could follow, and the fact is that there is a history that has been established over the course of time. The Federal Aviation Agency, for example, does ask for certain research to be done for the purpose of providing better safety measures at airports, and then it creates a market for these particular goods. Under such circumstances the Government does take

title. That is one of the circumstances under which it should.

Mr. ASPINALL. May I also suggest that section 1(b) of the statement, which covers cases in which "a principal purpose of the contract is for exploration into fields which directly concern the public health or public welfare" would also take care of the original answer to my first question? Is that correct?

Mr. DADDARIO. The gentleman referred to section 1(b); I think he means section 1(a)(2) of the memorandum. This, again, is one of the instances under which the agency head would normally take title and to which, later on in the President's memorandum, there are exceptions.

Mr. ASPINALL. Mr. Chairman, may I ask one more question?

Can the gentleman think of any exceptions to what he has just said under this bill; that is, cases in which public money might be spent under this bill without the public's having full and free access to the information and results which flow from the expenditure?

Mr. DADDARIO. It is difficult to determine just what is meant by the public's having full and free access. I think I can explain it in this way: The Government in every instance would get a free license under which it would not pay any royalties. The public would get information in the manner in which I have already outlined. But where it would be necessary to carry out the policy as stipulated in the memorandum—in order to further advance the development of a dynamic and efficient economy and to expand knowledge derived under such research—exception would be made, but in such event the public would be protected through the Government retaining a royalty-free license.

Mr. ASPINALL. The gentleman from Connecticut has made a great study, and has spent a great deal of time on this particular matter. He has said that the present policy as set by the President is a good policy to follow until there is a change made, perhaps, by the Congress.

Mr. DADDARIO. I think the President's policy is a step in the right direction. I am pleased by the fact that there will be constant review made of it. It is my hope that sometime in the future this will lead to full committee action by those committees which have jurisdiction so that we may have a Government-wide patent policy for all agencies.

Mr. ASPINALL. And at that time, would my friend from Connecticut be willing to see to it that whatever change was made, it was made applicable to this particular legislation?

Mr. DADDARIO. I certainly would follow it very closely.

Mr. ASPINALL. I thank the gentleman very much.

The CHAIRMAN. The time of the gentleman from Connecticut [Mr. DADDARIO] has expired.

(Mr. DADDARIO (at the request of Mr. HOLIFIELD) was given permission to proceed for 3 additional minutes.)

Mr. HOLIFIELD. Mr. Chairman, will the gentleman yield?

Mr. DADDARIO. I yield.

Mr. HOLIFIELD. Mr. Chairman, I have not studied the gentleman's amendment. I have just seen it. "But I would like to say this, that I am not satisfied with the President's memorandum of October 10, 1963. I think it is a memorandum which for some unknown reason he agreed to put out, and, of course, we are going to have to abide by it as long as that memorandum is the rule of the day. But there have been millions of dollars of the Government's money spent in defense contracts and NASA contracts and other kinds of Government-funded contracts where the contractor has been allowed to obtain patents for his own benefit, out of money expended by the taxpayers. In the Joint Committee on the Atomic Energy Act there was an attempt made to bring some corrective measures into view in the handling of Government contracts. Under those provisions, in the Atomic Energy Act, the Government has claimed some 1,100 patents and made them available to all of industry. These are patents for which the Government has funded money.

The gentleman says that the Government is protected in being allowed to have the benefit of these patents which are given to industry under these contracts.

Well, I say that the Government gets very little good out of this particular protection, because the Government is not in the business of production.

While the Government has the right to utilize those patents royalty free, at the same time the Government is not in the position of production, as a rule. It is a very seldom that the Government avails itself of that type of protection.

Where the real protection should be would be to give to every segment of industry the right to use any kind of a device or any kind of a patent procedure which is paid for by Federal funds—and this particular right is not protected under the President's memorandum. Therefore, I just wanted the RECORD to show that some of us at least have grave doubts as to the protection which the taxpayer receives under the Government's memorandum.

Mr. DADDARIO. I might say to the gentleman from California that this is part of the argument, and we have discussed this question in the past. It is an argument, however, which does have various shades and meanings which we should understand. The Government is not in the business of production, and neither should it be.

Mr. HOLIFIELD. That is right.

Mr. DADDARIO. Under our form of government it has always been the case to look toward the free enterprise system so that we could develop a consumer product which would be to the benefit of all the people and which would be competitive in the market places of the world.

The CHAIRMAN. The time of the gentleman from Connecticut has again expired.

(Mr. DADDARIO, by unanimous consent (at the request of Mr. HOLIFIELD), was granted permission to proceed for 2 additional minutes.)

Mr. DADDARIO. I believe we have done an outstanding job in doing this. There is no question that it has brought us to the forefront of world leadership in scientific research and development and in production. There does seem to me—and it is not with the intent of getting into an argument with the gentleman—that there is within the precepts of the President's memorandum the opportunity to develop over a period of time a patent policy which will in all cases protect the Government and the individuals with whom it deals.

I believe it does direct, in the interest of the public health and welfare, that the Government should take a strong position, for example. It is my belief that it is a strong policy and a good one, if we adhere to it and if we follow the suggestion made in the memorandum that, and I quote, "there shall be prepared at least annually reports concerning the effectiveness of this policy, including recommendations for revision and modification, if necessary, in light of practices and determinations of the agencies in the disposition of patent rights under their contracts," if this is done, and I expect it will be, there will be no danger at all.

Mr. HOLIFIELD. If the gentleman will yield further, I will say this: I know this is a very complicated subject and that we cannot discuss it in the limited time which we have at this particular time, but I just wanted the record to show that I have grave apprehensions about this, and many others have such apprehensions. If it is implemented properly and if the studies are made for some purpose and intent; that is, for the protection of the taxpayer, then I say it is possible that they can be protected. But if it goes along, as I surmise it will, the taxpayers of the United States will continue to be defrauded out of patent information and devices for which they have paid with tax money, and it will go into the coffers of the individual contractor who has no right to it, because he is paid for the job that he performs.

If we really followed the principle of American patent rights, that the person who pays for the research and development is entitled to the fruits thereof, then the Government will get the fruits thereof and make it available on a widespread basis to all industry and not to the particular patented contractor who happens to have that particular research and development contract.

The CHAIRMAN. The time of the gentleman from Connecticut has again expired.

(Mr. DADDARIO asked and was given permission to proceed for 1 additional minute.)

Mr. DADDARIO. I would like to say in answer to that statement that I have faith in our executive agency heads. I believe they will be doing their job properly. It is their responsibility and it is our responsibility to see to it that they do it. The fact is that this gives an agency head the ability to operate with the flexibility necessary to adjust proprietary interests in an equitable way and in consideration of what is in the best interest of the public.

The CHAIRMAN. The question is on the amendment offered by the gentleman from Connecticut.

The amendment was agreed to.

AMENDMENT OFFERED BY MR. KEITH

Mr. KEITH. Mr. Chairman, I offer an amendment.

The Clerk read as follows:

Amendment offered by Mr. KEITH: On page 12, line 16, insert after the word "provided", the words "on a dollar-for-dollar matching basis."

Mr. KEITH. Mr. Chairman, I note as I read the bill that there is no matching basis in the initial phase of this program. It has been my experience, at the State level, that any Federal program offering financial assistance and not requiring matching funds would be most wholeheartedly supported by any State regardless of the extent and nature of the need.

I believe very strongly that we would have more development of water resources if it could be on a matching basis in its entirety. We would have more dollars in the program, we would have better cooperation at the local level, and we would have a better foundation upon which to build the participating program that follows the initial phases.

I hope my amendment will be agreed to.

Mr. ROGERS of Texas. Mr. Chairman, I rise in opposition to the amendment offered by the gentleman from Massachusetts.

Mr. Chairman, it would be bad to insert that at this time because it would be an additional imposition on the States. This program is intended more or less as a supplemental program in water research, and in scientific research development. The States already have the facilities available in many of these areas. The amount of money involved in this going to each State is not going to be sufficient to set up a separate and distinct program. It will be supplemental, and these funds will be used to get into research operations that they have not been able to get into. The States in effect are putting up more than half of the money that will produce beneficial results in the overall program.

The other portion of this act which provides for specific research projects does require matching funds from the States.

Mr. Chairman, I would urge that the amendment be defeated.

Mr. KEITH. Mr. Chairman, I do not feel it is any imposition on the States to ask them to accept \$10 million, and I am surprised that my colleague would say that.

The CHAIRMAN. The question is on the amendment offered by the gentleman from Massachusetts.

The question was taken; and on a division (demanded by Mr. KEITH) there were—ayes 6, noes 18.

So the amendment was rejected.

AMENDMENT OFFERED BY MR. TAFT

Mr. TAFT. Mr. Chairman, I offer an amendment.

The Clerk read as follows:

Amendment offered by Mr. TAFT: Page 17, line 4, after the word "such" insert the word "procedural."

Page 17, line 5, before the period insert "but no such rule or regulation or other action of the Secretary of Interior hereunder shall control or direct the conduct or the subject of the research, investigation, and experiments in relation to water resources authorized under this Act."

Mr. TAFT. Mr. Chairman, the purpose of the amendment was made clear to those who were on the floor a few minutes ago when I asked the question in regard to the rulemaking power itself. It seems to me that if this is to be a State-oriented program, and that is apparently the intent by referring to a State university or land-grant college, under the circumstances the university or college itself should make the choice of the area of research. The rules and regulations which the Secretary of the Interior might prescribe shall only relate to the procedures to be followed rather than be substantive and put conditions on the direction of research or the type of research the university or college chooses to engage in.

I would ask your support of the amendment.

Mr. ROGERS of Texas. Mr. Chairman, I rise in opposition to the amendment.

Mr. Chairman, I do not think this type of amendment should be adopted in any legislation passed by the Congress, for the reason there has long been a contest with regard to the extent of the authority of the departments downtown to enact rules and regulations that get over into the legislative field. The Constitution of this Nation provides that the legislative powers are vested in the Congress of the United States. When you add an isolated amendment like this to a bill of this kind, you simply open the door for the departments and agencies downtown to say every time this is not spelled out in a bill and every i dotted and t crossed that the authority was implied to do anything they wanted to, to invade the legislative field.

I yield to no one in my desire to prevent encroachment upon the legislative processes. If you will look back over the record you will find we have had this same battle with regard to the independent agencies downtown. If you adopt an amendment of this kind you are opening the door to the very thing you are trying to avoid. If you want to say that you are going to give so much money to each State and that the Secretary of the Interior has no say as to what it is used for, there is no need to have reports made to the Congress each year, there is no need to have the States report to the Secretary of the Interior as to what the States did with the money.

This situation we have outlined in this bill and have gone over in subcommittee is to protect the money invested in this program to see that an effective program is worked out. I hope the amendment is not adopted.

Mr. TAFT. Mr. Chairman, will the gentleman yield?

Mr. ROGERS of Texas. I yield to the gentleman from Ohio.

Mr. TAFT. I would just like to comment to the gentleman that I think his argument refers to situations that do not exist in the rulemaking power, but I do

not agree with his judgment that this is not desirable. It seems under the rule-making power the courts have sustained extremely broad powers for the agencies to go ahead and make general rules and regulations such as this. It is wholly meaningless to say at the present time if you put this in you are going to open those gates. Those gates are already open and the floods are coming through.

Mr. ROGERS of Texas. I think if the gentleman will review the record that was made in the committee on H.R. 8316 in the Committee on Interstate and Foreign Commerce he will find much law spelled out on the subject I discussed, and I think he will find this assumption of authority by the departments downtown has been on their own authority and not on what the courts have held. There have been a lot of things in these decisions by the courts that have been taken out of context. Unless we preserve this rule intact and not be trying to tack these little exceptions on to it to try to spell it out, I think the legislative body itself is bound to be much safer. I would hope the amendment would not be adopted.

The CHAIRMAN. The question is on the amendment offered by the gentleman from Ohio.

The amendment was rejected.

The CHAIRMAN. The question is on the committee amendment, as amended.

The committee amendment was agreed to.

The CHAIRMAN. Under the rule, the Committee rises.

Accordingly, the Committee rose; and the Speaker having resumed the chair, Mr. SMITH of Iowa, Chairman of the Committee of the Whole House on the State of the Union, reported that that Committee having had under consideration the bill (S. 2) to establish water resources research centers at land-grant colleges and State universities, to stimulate water research at other colleges, universities, and centers of competence, and to promote a more adequate national program of water research, pursuant to House Resolution 711, he reported the bill back to the House with an amendment adopted in Committee of the Whole.

The SPEAKER. Under the rule, the previous question is ordered.

The question is on the amendment.

The amendment was agreed to.

The SPEAKER. The question is on the third reading of the bill.

The bill was ordered to be read a third time, and was read the third time.

The SPEAKER. The question is on the passage of the bill.

The bill was passed.

The title was amended so as to read: "An Act to establish water resources research centers at land-grant colleges and State universities, to promote a more adequate national program of water research, and for other purposes."

A motion to reconsider was laid on the table.

GENERAL LEAVE TO EXTEND

Mr. ROGERS of Texas. Mr. Speaker, I ask unanimous consent that all Mem-

Digest of CONGRESSIONAL PROCEEDINGS

OF INTEREST TO THE DEPARTMENT OF AGRICULTURE

OFFICE OF
BUDGET AND FINANCE

(For information only;
should not be quoted
or cited)

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HIGHLIGHTS: Rep. Lipscomb objected to wheat sales to Russia. Rep. Hagen (Calif.) and others urged increased domestic sugar quotas. Rep. Reuss criticized agricultural trade policies of Common Market. Sen. Hartke expressed concern over beef prices.

HOUSE

1. SUGAR. Rep. Hagen, Calif., reviewed the sugar situation stating that while the present domestic crop is expected "to yield some 3,350,000 tons to 3,400,000 tons...under the present law, the beet sugar quota for 1964 is only 2,700,000 tons" and that "without a quota adjustment, domestic sugarbeet producers will be cut back drastically." Several other Representatives spoke in agreement with Rep. Hagen. pp. 12457-72
2. FOREIGN TRADE. Rep. Lipscomb criticized sales of wheat to Russia and "reexportation from the Soviet Union to Rumania" and inserted several excerpts from the Baltimore Sun which stated, "Russia wants more wheat." pp. 12456-7
Rep. Reuss expressed concern "that U. S. bargaining strategy for the Kennedy-Johnson round now underway is too exclusively centered on the European Common Market" and criticized the agricultural trade policies of the Common Market. pp. 12476-8

3. EXPORT CONTROL. Received from the Commerce Department a report covering the 1st quarter of 1964, pursuant to the Export Control Act of 1949. p. 12487
4. VEHICLES. Received from the Attorney General a proposal to authorize the expenditure of appropriated funds for insurance covering the operation of motor vehicles in foreign countries; to Government Operations Committee. p. 12487
5. FORESTRY; PERSONNEL. Received from this Department a proposal to validate certain payments made to employees of the Forest Service; to Judiciary Committee. p. 12487

SENATE

6. CIVIL RIGHTS. Continued debate on H. R. 7152, the civil rights bill (pp. 12489, 12491-4, 12500-1, 12510-35). Sen. Mansfield filed a motion to invoke cloture which would limit debate on the bill. The motion is to be voted on Wed. (p. 12489).
7. BEEF PRICES. Sen. Hartke discussed the reasons for the decline in beef prices, reviewed actions taken by the Government to improve the situation, including actions to restrict imports and stimulate exports and the purchase of beef by this Department for schools and needy persons, and stated that this administration "has done almost everything possible to relieve a critical situation ...the final solution rests with the industry and a consensus among producers as to just what they want and should do." pp. 12503-4
8. WATER RESOURCES. Sen. Muskie inserted Assistant Secretary of the Interior Holum's address to the annual convention of the National Rivers and Harbors Congress reviewing national water and power programs and supporting enactment of legislation for expanded resources research, greater interdepartmental coordination of river basin planning, and establishment of a land and water conservation fund for development of recreational facilities. pp. 12498-9
Conferees were appointed on S. 2, to provide for the establishment of water resources research centers at land-grant colleges and State universities (pp. 12495-7). House conferees have not yet been appointed.
9. GOVERNMENTAL RELATIONS. Sen. Muskie commended a new book by Dr. W. Brooke Graves, "American Intergovernmental Relations." p; 12499
Sen. Metcalf inserted an address by Sen. Muskie reviewing "the growth and role of our governmental institutions." pp. 12501-2
10. PURCHASING. Sen. Morton inserted several items urging the Government to place a greater share of their purchasing with American companies in preference to foreign companies. p. 12536
11. LANDS; MINERALS. Sen. Moss was added as a cosponsor of S. 2765, to amend the act relating to the multiple use of the surface of the small tracts of the public lands in order to provide that certain varieties of sand and gravel shall be considered as valuable mineral deposits under the mining laws. p. 12494
12. STOCKPILE. Both Houses received from GSA a copy of a notice to be published in the Federal Register of "the proposed disposition of 10 materials now held in the national stockpile." pp. 12490, 12487

over from their parents. The home must provide the training for citizenship. Love and respect for God and country can best be learned there. By fulfilling our obligations to our family, we are also serving our country.

A strong America must be well informed. It must realize the dangers confronting its every step as the world power of our time. Such threats as communism and fascism gain their strength by controlling the minds of men. Americans must take an interest in current affairs on all levels of our society. By reading newspapers daily and keeping informed by good magazines and periodicals, we can help America become a bulwark against the enemies which press her on every side.

Along with the advantages of being an American, there are responsibilities. We must be willing to assume our share of the burden of maintaining freedom. Democracy is too often taken for granted. Democracy can work only as long as the people are willing to work for it. An appreciation of our country comes from an understanding and respect for the laws that govern her. It is the duty of each citizen to know, to understand, and to defend the Constitution. Our respect for the democratic principles of law and order should serve as an example to others.

Americans must take an active part in their government. Walt Whitman warns against becoming merely onlookers in his poem, "I Sit and Look Out" in which he states:

"All these—all the meanness and agony without end I sitting look out upon,
See, hear, and am silent."

Some ways in which we could cultivate an interest in our government are by attending lectures, by taking part in group discussions, by volunteering our services to worthwhile community projects, and by participating in the activities of our political party at the local level. The success of democracy is dependent upon the intellectual and emotional involvement of its citizens.

The leadership of America requires well-rounded citizens. The American mosaic is a mixture of various cultures, sports, and philosophies. A citizen cannot afford to be one sided. He must develop an interest in both the cultural and physical part of the mosaic. America needs strong men, physically, and mentally, to maintain the peace purchased through two world wars and numerous small ones.

America has just begun to grow. Vast resources lie untapped below her crust. The atmosphere above has barely been pierced. A new ambitious generation with vision is needed to assume the burden of world leadership. Through her citizens, America can continue to grow and prosper. It is our responsibility to continue building and improving the great American mosaic.

MAKING DEMOCRACY WORK BETTER

(By Mary Beth Glode, Platte Valley High School, Saratoga, Wyo.)

"I go for all sharing the privileges of government who assist in bearing its burden," Abraham Lincoln once said. Let us inquire into the nature of this democracy and attempt to discover at least some of the ways in which we, as citizens in this great Government, can help to make democracy function more effectively. Too often many of us are inclined to take the existence of our democratic Government for granted. We forget that others before us established our democracy and passed on to us a working system. Our job is to keep this system working and, if possible, improve it. In order to do this, we must be sure that we understand its basic meaning.

A democracy is that form of government in which sovereign power rests in the peo-

ple. It is a limited government, in that it can exercise only those powers granted to it by the people. In American usage, the word "democracy" refers to indirect or representative rather than direct democracy. The word "republic" is for us synonymous with representative government.

Democracy is based on the fundamental equality of all men; that all men possess the same rights to "life, liberty, and the pursuit of happiness" without regard to race, color, religion, or economic, or social status. No man is privileged over another before the law, and each is free to develop himself to his fullest extent.

Another basic in democracy is the firm belief in the people's capacity for self-government. This conviction grew with the demand for equal opportunity—at first, political and legal; later, social and economic as well.

Good sportsmanship is also an essential in a successful democracy. All citizens must be good losers and generous winners.

Although our democratic Government with its system of checks and balances cannot act as promptly as 24-hour dictatorships, it has compensating advantages. The fruits of a democracy ripen slowly and are not spectacular, but their roots grow deep and promote contentment and permanency.

Democracy is a challenge, not to a few, not to the other fellow, but to all. It is as James Bryce has said, "No Government demands so much from the citizen as democracy and none gives back so much."

Our personal liberty is very precious. But we must understand that because all men are equal and enjoy the same rights, each man cannot enjoy absolute or complete freedom. Every individual's freedom is relative.

The true meaning of personal liberty is found in the drawing of a proper balance between license and unbridled authority.

As citizens of a democracy, we enjoy many privileges. This liberty, however, is under law. As in any form of government, democracy is dependent upon law and the enforcement of that law for its life. We are proud of our participation in lawmaking, but are we ready to accept the responsibilities and obey the law? And even more significant, are we willing to respect the law? In a democracy, obedience should always be firmly rooted in respect for law. This respect implies an attitude of mind which comprehends the necessity for law and the relationship of each individual to it. The acknowledgement of the responsibility to obey the law, whether or not one approves of a particular law, should have its beginning in the home. We must work until this respect for law becomes a national virtue. If this can be accomplished, the continued success of our democratic system will be assured.

Yet, if democracy is so clearly dependent upon the extent to which its citizens obey the law of the land, we immediately recognize one of the most serious internal problems our democracy faces—crime. Perhaps the most discouraging feature of our crime rate is the juvenile crime percentage increase.

An attack upon the physical causes for crime and an attack upon the human failings which produce it, could solve much of our problem. A proper understanding of the background of youthful lawbreakers is one of the first steps toward elimination. J. Edgar Hoover has pointed out that the press and the movies play a dominant part in creating the attitude of the individual toward the law. He advocates more praise and respect for those who enforce the laws.

Hoover has said that organized crime could be eliminated in the United States within 48 hours by a vigorous law enforcement at the local level. The Senate Kefauver Committee on Crime has proposed giving the Securities and Exchange Commis-

sion more authority to expose the infiltration of legitimate business by criminal elements. It proposed placing all wire services transmitting gambling information under the supervision of the Federal Trade Commission. The committee favored requiring all who admittedly profit from locally outlawed activities to file complete financial statements along with their tax returns each year. It also favored the creation of a permanent Federal Crime Commission. But it must be emphasized that this "filth on America's doorstep" can be effectively eliminated only with the active backing of local citizens across the Nation.

An enlightened public is one of the surest, most indispensable requirements of democracy. A firm loyalty is based on knowledge. In order to combat the threat of communism, we must be informed. Naturally, then, because today's youth are tomorrow's leaders, they should be required to study a course in American government and problems. There should be active participation in the many nonpartisan groups formed especially to provide citizens with objective information on public affairs.

However, an informed citizen must also be active. A citizen can participate by intelligent voting, attending public meetings, working with the political party of his choice, and running for a public office. Many cities have gained active participation through the establishment of "gripe offices" in which citizens are invited to complain. Removing the few obstacles to intelligent participation, for example the long ballot, remains one of our serious problems. In this particular situation, the number of elective officials could well be cut down with no harm whatsoever to the democratic process.

An American citizen is actually under four separate governments: Federal, State, county, and local. Although each has different activities, their work often overlaps. A thorough reorganization on each level could well eliminate needless duplication and waste.

Improvement is also necessary in our judicial procedures. These aspects need some reformation: delay, cost, complex organization, occasional overzealousness, and our present jury system.

On the international level, one of the biggest assurances of a continued democracy is the United Nations. Too often this organization's many accomplishments toward peace are overlooked.

We must conclude, then, that the U.S. Constitution could not and does not lay down all details of Government. Many problems have arisen which could not be foreseen. There must be a continuing endeavor on our part to build the best possible life on earth, for all men and for each man. In the course of the unending effort to preserve our rights and improve our condition, we have and will face many critical challenges. But we have and will solve these problems with that firm belief that we are the heirs to a system of government and a way of life which must depend for its very existence upon what we, as people and as individuals are willing to do. Our American heritage—a faith in individualism, in freedom, and in equality—has made us the greatest nation on earth. But the future is in our hands.

WATER RESOURCES RESEARCH ACT OF 1964

Mr. ANDERSON. Mr. President, I ask that the Chair lay before the Senate a message from the House of Representatives on Senate bill 2.

The PRESIDING OFFICER laid before the Senate the amendments of the House of Representatives to the bill (S. 2) to establish water resources research centers at land-grant colleges

and State universities, to stimulate water research at other colleges, universities, and centers of competence, and to promote a more adequate national program of water research, which were, to strike out all after the enacting clause and insert:

That (a) this Act may be cited as the "Water Resources Research Act of 1964."

(b) In order to assist in assuring the Nation at all times of a supply of water sufficient in quantity and quality to meet the requirements of its expanding population, it is the purpose of the Congress, by this Act, to stimulate, sponsor, provide for, and supplement present programs for the conduct of research, investigations, experiments, and the training of scientists in the fields of water and of resources which affect water.

TITLE I—STATE WATER RESOURCES RESEARCH INSTITUTES

SEC. 100. (a) There are authorized to be appropriated to the Secretary of the Interior for the fiscal year 1965 and for each of the nine fiscal years subsequent thereto sums adequate to provide \$75,000 to each of the several States in the first year, \$87,500 in each of the second and third years, and \$100,000 each year thereafter to assist each participating State in establishing and carrying on the work of a competent and qualified water resources research institute, center, or equivalent agency (hereinafter referred to as "institute") at one college or university in that State, which college or university shall, unless otherwise provided by act of the legislature of the State concerned, be a college or university established in accordance with the Act approved July 2, 1862 (12 Stat. 503), entitled "An Act donating public lands to the several States and territories which may provide colleges for the benefit of agriculture and the mechanic arts": *Provided*, That (1) if there is more than one such college or university in a State, established in accordance with said Act of July 2, 1862, funds under this Act shall, in the absence of a designation to the contrary by act of the legislature of the State, be paid to the one such college or university designated by the Governor of the State to receive the same subject to the Secretary's determination that such college or university has, or may reasonably be expected to have, the capability of doing effective work under this Act; (2) two or more States may cooperate in the designation of a single interstate or regional institute, in which event the sums assignable to all of the cooperating States shall be paid to such institute; and (3) a designated college or university may, as authorized by appropriate State authority, arrange with other colleges and universities within the State to participate in the work of the institute.

(b) It shall be the duty of each such institute to plan and conduct and/or arrange for a component or components of the college or university with which it is affiliated to conduct competent research, investigations, and experiments of either a basic or practical nature, or both, in relation to water resources and to provide for the training of scientists through such research, investigations, and experiments. Such research, investigations, experiments, and training may include, without being limited to, aspects of the hydrologic cycle; supply and demand for water; conservation and best use of available supplies of water; methods of increasing such supplies; and economic, legal, social, engineering, recreational, biological, geographic, ecological, and other aspects of water problems, having due regard to the varying conditions and needs of the respective States, to water research projects being conducted by agencies of the Federal and State Governments, the agricultural experiment stations, and others, and to avoid-

ance of any undue displacement of scientists and engineers elsewhere engaged in water resources research.

SEC. 101. (a) There is further authorized to be appropriated to the Secretary of the Interior for the fiscal year 1965 and for the nine fiscal years thereafter sums not in excess of the following: 1965, \$1,000,000; 1966, \$2,000,000; 1967, \$3,000,000; 1968, \$4,000,000; and 1969 and each of the five succeeding years, \$5,000,000. Such moneys when appropriated, shall be available to match, on a dollar-for-dollar basis, funds made available to institutes by States or other non-Federal sources to meet the necessary expenses of specific water resources research projects which could not otherwise be undertaken, including the expenses of planning and coordinating regional water resources research projects by two or more institutes.

(b) Each application for a grant pursuant to subsection (a) of this section shall, among other things, state the nature of the project to be undertaken, the period during which it will be pursued, the qualifications of the personnel who will direct and conduct it, the importance of the project to the water economy of the Nation, the region, and the State concerned, its relation to other known research projects theretofore pursued or currently being pursued, and the extent to which it will provide opportunity for the training of water resources scientists. No grant shall be made under said subsection (a) except for a project approved by the Secretary, and all grants shall be made upon the basis of the merit of the project, the need for the knowledge which it is expected to produce when completed, and the opportunity it provides for the training of water resources scientists.

SEC. 102. Sums available to the States under the terms of sections 100 and 101 of this Act shall be paid to their designated institutes at such times and in such amounts during each fiscal year as determined by the Secretary, and upon vouchers approved by him. Each institute shall have an officer appointed by its governing authority who shall receive and account for all funds paid under the provisions of this Act and shall make an annual report to the Secretary on or before the 1st day of September of each year, on work accomplished and the status of projects underway, together with a detailed statement of the amounts received under any of the provisions of this Act during the preceding fiscal year, and of its disbursement, on schedules prescribed by the Secretary. If any of the moneys received by the authorized receiving officer of any institute under the provisions of this Act shall by any action or contingency be found by the Secretary to have been improperly diminished, lost, or misapplied, it shall be replaced by the State concerned and until so replaced no subsequent appropriation shall be allotted or paid to any institute of such State.

SEC. 103. Moneys appropriated pursuant to this Act, in addition to being available for expenses for research, investigations, experiments, and training conducted under authority of this Act, shall also be available for printing and publishing the results thereof and for administrative planning and direction. The institutes are hereby authorized and encouraged to plan and conduct programs financed under this Act in cooperation with each other and with such other agencies and individuals as may contribute to the solution of the water problems involved, and moneys appropriated pursuant to this Act shall be available for paying the necessary expenses of planning, coordinating, and conducting such cooperative research.

SEC. 104. The Secretary of the Interior is hereby charged with the responsibility for the proper administration of this Act and, after full consultation with other interested Federal agencies, shall prescribe such rules

and regulations as may be necessary to carry out its provisions. He shall require a showing that institutes designated to receive funds have, or may reasonably be expected to have, the capability of doing effective work. He shall furnish such advice and assistance as will best promote the purposes of this Act, participate in coordinating research initiated under this Act by the institutes, indicate to them such lines of inquiry as to him seem most important, and encourage and assist in the establishment and maintenance of cooperation by and between the institutes and between them and other research organizations, the United States Department of the Interior, and other Federal establishments.

On or before the 1st day of July in each year after the passage of this Act, the Secretary shall ascertain whether the requirements of section 102 have been met as to each State, whether it is entitled to receive its share of the annual appropriations for water resources research under section 100 of this Act, and the amount which it is entitled to receive.

The Secretary shall make an annual report to the Congress of the receipts and expenditures and work of the institutes in all States under the provisions of this Act. His report shall indicate whether any portion of an appropriation available for allotment to any State has been withheld and, if so, the reasons therefor.

SEC. 105. Nothing in this Act shall be construed to impair or modify the legal relation existing between any of the colleges or universities under whose direction an institute is established and the government of the State in which it is located, and nothing in this Act shall in any way be construed to authorize Federal control or direction of education at any college of university.

TITLE II—MISCELLANEOUS PROVISIONS

SEC. 200. The Secretary of the Interior shall obtain the continuing advice and cooperation of all agencies of the Federal Government concerned with water problems, of State and local governments, and of private institutions and individuals, to assure that the programs authorized in this Act will supplement and not duplicate established water research programs, to stimulate research in otherwise neglected areas, and to contribute to a comprehensive, nationwide program of water and related resources research. He shall make generally available information and reports on projects completed, in progress, or planned under the provisions of this Act, in addition to any direct publication of information by the institutes themselves.

SEC. 201. Nothing in this Act is intended to give or shall be construed as giving the Secretary of the Interior any authority or surveillance over water resources research conducted by any other agency of the Federal Government, or as repealing, superseding, or diminishing existing authorities or responsibilities of any agency of the Federal Government to plan and conduct, contract for, or assist in research in its areas of responsibility and concern with water resources.

SEC. 202. Contracts or other arrangements for water resources work authorized under this Act with an institute may be undertaken without regard to the provisions of section 3684 of the Revised Statutes (31 U.S.C. 529) when, in the judgment of the Secretary of the Interior, advance payments of initial expense are necessary to facilitate such work.

SEC. 203. In carrying out the provisions of this Act, the Secretary of the Interior shall adhere to the Statement of Government Patent Policy which was promulgated by the President in his memorandum of October 10, 1963 (3 CFR, 1963 Supp., p. 238).

SEC. 204. There shall be established, in such agency and location as the President de-

termines to be desirable, a center for cataloging current and projected scientific research in all fields of water resources. Each Federal agency doing water resources research shall cooperate by providing the cataloging center with information on work underway or scheduled by it. The cataloging center shall classify and maintain for general use a catalog of water resources research and investigation projects in progress or scheduled by all Federal agencies and by such non-Federal agencies of government, colleges, universities, private institutions, firms, and individuals as voluntarily may make such information available.

SEC. 205. The President shall, by such means as he deems appropriate, clarify agency responsibilities for Federal water resources research and provide for interagency coordination of such research, including the research authorized by this Act. Such coordination shall include (a) continuing review of the adequacy of the Government-wide program in water resources research, (b) identification and elimination of duplication and overlaps between two or more agency programs, (c) identification of technical needs in various water resources research categories, (d) recommendations with respect to allocation of technical effort among the Federal agencies, (e) review of technical manpower needs and findings concerning the technical manpower base of the program, (f) recommendations concerning management policies to improve the quality of the Government-wide research effort, and (g) actions to facilitate interagency communication at management levels.

SEC. 206. As used in this Act, the term "State" includes the Commonwealth of Puerto Rico.

And to amend the title so as to read: "An Act to establish water resources research centers at land-grant colleges and State universities, to promote a more adequate national program of water research, and for other purposes."

Mr. ANDERSON. Mr. President, I move that the Senate disagree to the amendments of the House, request a conference thereon with the House, and that the Chair appoint the conferees on the part of the Senate.

The motion was agreed to; and the Presiding Officer appointed Mr. JACKSON, Mr. ANDERSON, Mr. BIBLE, Mr. KUCHEL, and Mr. ALLOTT conferees on the part of the Senate.

PRESIDENT JOHNSON, FRONT-PAGE NEWS

Mr. BARTLETT. Mr. President, President Johnson and his administration continue to go from strength to strength. The President has used his great popularity across the country in an effort to produce unity of purpose and resolve, where once there were dissonance and discord. The extent of his success is a tribute, indeed, to this remarkable man. The energy and ability of our President have been felt in Alaska, as well as everywhere else in the 50 States.

I ask unanimous consent that an editorial entitled "President Johnson Remains Page 1 News," from the April 22 issue of the Anchorage Daily Times, be made a part of the RECORD at this point.

There being no objection, the editorial was ordered to be printed in the RECORD, as follows:

PRESIDENT JOHNSON REMAINS PAGE 1 NEWS

Watching President Johnson and the Republicans' would-be Presidents is like watching a bedside lamp trying to compete for attention with an all night neon sign.

He has been getting bouncier and livelier, talking more and doing more, ever since he moved into the White House, perhaps as his confidence increased. But something which happened recently really seemed to charge his batteries.

While public opinion polls put him away in front of any Republican, last Wednesday visiting newspaper editors decided it was not a question of whether he would win in this election year but only by how much.

He has been outdoing himself ever since: A news conference the next day, a meeting with the editors Friday, a news conference Saturday, handshaking Sunday, a big foreign policy speech Monday, another news conference Tuesday.

Most of the time on these occasions he made announcements that got headlines.

The Republicans are whirling around and popping off practically every day.

They criticize him or they offer solutions for the ills here and elsewhere, all the time talking politics, and playing it. His advantage is that he can play politics without mentioning it.

While they would like a voice in the bills, he gets a big play just by saying something or doing something as President, if it's only shaking hands with tourists or walking in the White House rose garden.

This lucky political position of a President in an election year has been true of every President but none ever realized it better than Johnson or sought to make more use of it.

He has been a politician 24 hours daily since he came to Congress in 1937 but never more so than when he repeats he just wants to be President of all the people and indicates he wouldn't think of talking politics until the campaign begins.

President John F. Kennedy stayed busy trying to keep the public reminded of him. But in this Johnson is outdoing Kennedy who was a master at it.

He can get more attention just dancing, and he loves to dance, that a Republican presidential hopeful like Harold Stassen if he shouted through a bullhorn all day.

Johnson is probably the greatest White House dancer since Theodore Roosevelt, if Roosevelt danced. If not Roosevelt, then it would have to be someone back in the 19th century.

Although, come to think of it, if Calvin Coolidge danced that would have been an exciting spectacle.

A good example of how Johnson keeps himself in the news is to check the front pages of newspapers for the past 2 weeks. There was hardly a day when he didn't do or say something to put him there.

He got a lot of mileage out of the threatened rail strike alone: calling labor and management together, getting the strike pushed off, getting agreement on another 15 days of negotiation, making hopeful statements about the outcome.

Besides that, and going backward for the past 2 weeks, day by day, here is part of what Johnson did:

Warned Cuba not to shoot down American planes flying back over to make a check; announced cutback in material for nuclear weapons; shook hands with tourists after church; raised the possibility of ending the draft within 10 years and tossed out a barrel of figures on the economy; talked about the job of the presidency; another report on the economy and a warning to both sides in the civil right dispute to use moderation; had his picture taken with Jordan's visiting King Hussein; threw the opening pitch of

the baseball season and ordered a freeze on Government employees' grades and salaries; welcome Soviet Premier Khrushchev as a peace apostle.

In case anyone thinks he may slow down after all this: Today he arranged to go to New York and make a speech opening the World's Fair.

"CONSTITUTIONAL FREEDOM—THE RIGHT TO BE LET ALONE"

Mr. ROBERTSON. Mr. President, ever since prehistoric days when man became associated in tribes and later in nations, there has been tyranny—the strong have oppressed the weak. Throughout recorded history, the struggle of the individual has been the creation of a government which would recognize and protect the rights of the individual. The greatest progress since the dawn of civilization in behalf of a government dedicated to personal freedom was made when the 13 Original States ratified the Philadelphia Constitution of 1787. The statesmen who framed that Constitution will never be forgotten, because they fought for the freedom of the people.

No lasting monument has ever been built in memory of those who fought to increase the powers of government; yet that is the purpose of the pending bill, that masquerades under the pseudonym of civil rights. It has been blindly endorsed by many liberals, including a large number of Protestant ministers, Jewish rabbis, and Catholic priests, whose intentions are good and who sincerely believe that the bill will promote personal freedom. Yet, Members of the Senate who have studied the technical provisions of the bill know that it is a wolf in sheep's clothing. Instead of moving in the direction of personal freedom through less government control, it moves in the opposite direction. Everything in the bill deals with an increase in the powers of the Federal Government. All of the amendments offered to the bill, and all that will subsequently be offered, deal with limiting the power sought by the bill to be conferred upon the Federal Government.

To illustrate what a farce it is to call the pending bill "a bill to promote personal freedom," we need only to cite the views of one of the greatest liberals who has ever served on the U.S. Supreme Court—Mr. Justice Brandeis. In the case of *Olmstead v. United States*, 277 U.S. 438, decided in 1928, Mr. Justice Brandeis said:

The makers of our Constitution undertook to secure conditions favorable to the pursuit of happiness. They recognized the significance of man's spiritual nature, of his feelings and of his intellect. They knew that only a part of the pain, pleasure, and satisfactions of life are to be found in the material things. They sought to protect Americans in their beliefs, their thoughts, their emotions, and their sensations. They conferred, as against the Government, the right to be let alone—the most comprehensive of rights and the right most valued by civilized men.

Experience should teach us to be most on our guard to protect liberty when the Government's purposes are beneficent. Men born to freedom are naturally alert to repel invasion of their liberty by evil-minded rul-

ers. The greatest dangers to liberty lurk in insidious encroachment by men of zeal, well meaning, but without understanding.

DEVELOPMENT OF WATER AND POWER RESOURCES

Mr. MUSKIE. Mr. President, two of the most challenging areas of resource development today confronting the United States are water and power. In a period when our population is expanding rapidly and when our water and power requirements are increasing at an even faster rate, it is imperative that our national water and power policies match those demands.

The Kennedy-Johnson administration has accepted its responsibilities in these areas. Under the leadership of Secretary of the Interior Udall, and under the specific direction of Assistant Secretary Kenneth Holum, our programs for conservation and use of the water and power resources of the Nation have been marked by imagination and practical application.

The State of Maine has reason to be grateful for this approach to water power resource development. In 1961, the International Joint Commission rejected the proposed development of the Passamaquoddy tidal power project. At my request, President Kennedy directed the Department of Interior to review the work of the International Joint Engineering Board and the Commission, and to make recommendations to him, based on new engineering and economic data. This was done; and on July 16, 1963, President Kennedy announced and endorsed the new Quoddy project.

In a speech of June 5, 1964, Assistant Secretary Holum outlined to the Rivers and Harbors Congress the kind of approach the Department of Interior has taken to Quoddy and similar questions.

I believe that this address merits the attention of my colleagues, and I ask unanimous consent to have it printed in the RECORD.

There being no objection, the address was ordered to be printed in the RECORD, as follows:

ADDRESS BY KENNETH HOLUM, ASSISTANT SECRETARY OF THE INTERIOR FOR WATER AND POWER DEVELOPMENT, TO ANNUAL CONVENTION OF THE NATIONAL RIVERS AND HARBORS CONGRESS, WASHINGTON, D.C., JUNE 5, 1964

Your invitation asked that I speak to you this morning on "Our National Water and Power Programs." The subject is appropriate and challenging—but I am sure you recognize that I dare not take it too literally—because we do not have a national power program. Nor do we have a national water program.

We do have Federal programs designed to meet the needs of particular situations. We carry out these programs within the framework of certain basic principles. We do have rapidly expanding needs for electric power and growing requirements for fresh, pure water that will continue to challenge the ingenuity of our planners and the zeal of the Nation's conservationists.

We have a national responsibility to make certain that these growing requirements for water and power are satisfied. Because water and electric energy are essential for home, farm, and industry, a national administration that is concerned about economic

growth is inevitably concerned that both these basic commodities be available in sufficient supply and at the lowest possible cost.

For 3½ years, under the leadership of President Kennedy and now President Johnson, I have had the exciting opportunity to address my energies to questions related to water and power development. The years have been exciting because the Presidents have recognized the urgent need for aggressive and positive action in resource development and management.

The Department of the Interior has major responsibilities in the total resource areas. Secretary Udall's forward-looking policies and his determination have earned him a nationwide reputation as a man of action. Occasionally and inevitably he has found himself the center of controversy.

After 3½ years, however, I am convinced that individuals charged with national responsibilities for resource development and management and for administering Federal water and power programs can avoid controversy only by evading their responsibility. For there are many individuals and groups who represent different interests and differing points of view on resource development. Some of these differences are almost irreconcilable. Consequently, it is impossible to advance a major proposal and find unanimity of support.

Very few, if any, really significant programs or historical actions our Government has taken has ever been free of controversy. Among the most controversial was the adoption of our Constitution, and the Bill of Rights. There were those who even opposed the settlement of the West.

The advancement of new ideas and new concepts are not for the fainthearted. But progress demands change, reevaluation, and reshaping old plans to fit changing situations. Change inevitably meets resistance. So it was, when we addressed our efforts and attention to the neglected and critical water supply problems of the Pacific Southwest. It is no news to this group that this has involved the Department in a spirited debate that has extended from the top of the Rockies, throughout Arizona and southern California, and even into northern California's Central Valley. We could have avoided this noisy discussion by ignoring the problem and pretending it didn't exist. But the Nation would have been the loser. We could not do so in good conscience.

The population of the Southwest continues to increase at an almost unbelievable rate. Every day water becomes a dearer and more precious commodity. Unfortunately those elements that contribute to the problem do not stand still and politely wait for us to discuss the issue over a protracted length of time. We must act. And President Johnson is providing the leadership that will start this important area of the country back on the road to water sufficiency and the region and the Nation will be richer and stronger because of it.

Early in his administration, President Kennedy directed Secretary Udall to plan the interconnection of the Federal power systems with extra-high-voltage transmission lines. Long, efficient and comparatively inexpensive direct-current transmission lines will make it possible to take advantage of the hydrologic diversities between the Nation's major river systems, enable electric power systems to build large generating plants on the fuel fields, and permit the exploitation of daily and seasonal diversities between regions with different load characteristics.

A nationwide network of high-voltage transmission lines will not only make our country's electric system more efficient, but it can and will be a real tool for conserving both resources and capital.

With the Columbia River system spilling \$30 million worth of energy annually and

fuel cost comparatively high in the Pacific Southwest, an interconnection between the Bonneville Power Administration system, public and nonpublic systems in California, and Hoover Dam seemed clearly indicated. The Department's detailed engineering and economic studies established benefit-cost ratios in excess of 3 to 1.

In spite of the clearly indicated economic benefits, and the obvious opportunity to advance the Nation's technical know-how, we expected controversy when the Department proposed to interconnect the BPA system with the Bureau of Reclamation's northern California and Colorado River systems and with southern California. The controversy developed as we had anticipated.

Secretary Udall could have avoided 2 years of noisy controversy by ignoring an obvious opportunity to promote real conservation and improve the Nation's electric system. He didn't. I am certain that as a result of a good deal of hard work and patient leadership, there will emerge from this effort a system of high-voltage interconnection in our Western States that will be good for all interests and the country.

Passamaquoddy Bay is 4,000 miles from Hoover Dam. Harnessing the tides requires different engineering skills than building direct-current transmission lines. In the sixties, seventies, and years beyond, America will need to develop the total resources of East and West, North and South. Maine and New England need the development of their greater water and power resource potential to step up the pace of their economy and provide job opportunities for the people through cheaper power and good water for industry.

Harnessing the high tides at Quoddy and putting the energy of the St. John River in Maine to work will no doubt be controversial—and when the debate is over and the works have been built, New England will find its economy stimulated and Maine will find new opportunities emerging for its young citizens.

The administration's support for Trotters Shoals on the Savannah, Devils Jump on the North Fork of the Cumberland, and Knowles Dam on the Flathead River in Montana, has produced local, regional, and even national controversy. However, I am certain that before long these worthwhile projects will be authorized, funded, and constructed. They will add to the Nation's strength when these wise investments have been completed.

We do not have a national water or power policy in a literal sense. However, President Johnson and his administration have certain fundamental approaches in the resource field, which represent a viewpoint that is not merely concerned with today, but looks to meeting successfully the challenges of tomorrow. You can expect vigorous leadership willing to identify opportunities for worthwhile development and improved management and use.

Technological developments will enable us to maximize benefits and conserve resources. You will note increasing Federal leadership encouraging such new potentials as direct-current transmission, mine-mouth generation, harnessing the energy of the tides, economic water desalting, pumped-back storage, and the peaceful use of the atom. However, the established more conventional programs of water and power development continue to be the backbone of the Federal effort.

Our population growth rate and shorter workweek demand an immediate effort to preserve and develop more opportunities for outdoor recreation and relaxation. More and more of our people are living in major metropolitan areas, adding both to the complexity of the job and the urgency of getting it done.

At last, and for the first time, the Federal Government recognizes recreation as a full and equal partner of multipurpose water resource development.

Digest of CONGRESSIONAL PROCEEDINGS

OF INTEREST TO THE DEPARTMENT OF AGRICULTURE

OFFICE OF
BUDGET AND FINANCE

(For information only;
should not be quoted
or cited)

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HIGHLIGHTS: For highlights see page 6.

HOUSE

1. HOUSING LOANS. Passed, under suspension of the rules, H. J. Res. 1041, to continue from June 30 to Sept. 30, 1964, the program of insured rental housing loans for the elderly in rural areas. pp. 13259-60
2. MARKETING COMMISSION. Agreed to a Senate request for the return of S. J. Res. 71, to establish a National Commission on Food Marketing. p. 13252
3. BEEF. Rep. Jensen spoke in favor of the use of corn-fed beef. p. 13252
4. COMMODITY CREDIT CORPORATION. Received from the President the annual report of CCC for the fiscal year 1963. p. 13252
5. WATER RESEARCH. House conferees were appointed on S. 2, to establish Federal-aid water-research (p. 13253). Senate conferees have already been appointed.

6. FORESTRY. Passed without amendment H. R. 7588, to provide for enforcement of rules and regulations for the protection, development, and administration of the national forests and national grasslands. p. 13253
7. PERSONNEL. Passed as reported S. 1833, to authorize Government agencies to provide quarters, household furniture and equipment, utilities, subsistence, and laundry service to civilian Government officers and employees. pp. 13254-5
Passed, under suspension of the rules, S. J. Res. 103, to increase the authorization for the President's Committee on Employment of the Physically Handicapped. pp. 13257-9
8. DEFENSE PRODUCTION. Passed, under suspension of the rules, H. R. 10000, to extend the Defense Production Act from June 30, 1964, to June 30, 1966. pp. 13260-1
9. BANKING AND CURRENCY. Passed, under suspension of the rules, H. R. 11499, to extend for 2 years the authority of the Federal Reserve banks to purchase U. S. obligations directly from the Treasury. pp. 13261-2
10. FOREIGN TRADE. Rep. Michel inserted a colloquy on "Free Enterprise in the Free World: A Business-Government Joint Venture." pp. 13262-6
11. TRANSPORTATION. Rep. Younger deplored the refusal of the Rules Committee to clear H. R. 9903, the omnibus transportation bill, and inserted an article by Morris Forgash, "Transportation Equation: Apathy Plus Inaction Divided By Talk Equals Crisis and Nationalization." pp. 13280-4
12. WHEAT; COTTON; FOOD STAMPS. Rep. Cleveland claimed, and inserted an article by Rep. Curtis claiming, that there was a log-rolling deal in connection with the wheat-cotton bill and the food-stamp bill. pp. 13284-6
13. FARM LABOR. Rep. Teague, Calif., inserted an editorial favoring the Mexican farm labor program. p. 13286
14. FOREIGN AID. Rep. Halpern commended the foreign-aid bill as recently passed by the House. pp. 13286-7
15. WOOL LABELING. Rep. Gross expressed a hope that it is not true that the State Department requested postponement of H. R. 4994, to provide for the labeling of imported woven labels. p. 13287
16. FOREIGN TRADE; SURPLUS COMMODITIES. Received from FAS the report for May pursuant to Public Law 480. p. 13288
17. TAXATION. The Judiciary Committee submitted a report on State taxation of interstate commerce (H. Rept. 1480). p. 13288
18. CIVIL DEFENSE. The Rules Committee reported a resolution for consideration of H. R. 10314, to amend and extend the Civil Defense Act of 1950 (H. Rept. 1484). p. 13288
19. PUBLIC WORKS APPROPRIATION BILL. The Rules Committee reported a resolution for consideration of this bill, H. R. 11579, which is to be considered today, June 16. pp. 13288, D469

Speaker's desk the bill (H.R. 1887) for the relief of Yan Ok Kim, Chang In Wu, and Jung Yol Sohn, with Senate amendment thereto, and concur in the Senate amendment.

The Clerk read the title of the bill.

The Clerk read the Senate amendment, as follows:

Strike out all after the enacting clause and insert: "That notwithstanding the provisions of section 205(c) of the Immigration and Nationality Act, a petition may be filed in behalf of Chang In Wu by Mr. and Mrs. Robert Ainley, citizens of the United States, pursuant to section 205(b) of the said Act."

Amend the title so as to read: "A bill for the relief of Chang In Wu."

The SPEAKER pro tempore. Is there objection to the request of the gentleman from Ohio?

There was no objection.

The Senate amendment was concurred in.

The title was amended to read as follows: "A bill for the relief of Chang In Wu."

A motion to reconsider was laid on the table.

WATER RESEARCH

Mr. ASPINALL. Mr. Speaker, I ask unanimous consent to take from the Speaker's table the bill (S. 2) to establish water resources research centers at land-grant colleges and State universities, to stimulate water research at other colleges, universities, and centers of competence, and to promote a more adequate national program of water research, with House amendments thereto, insist on the House amendments, and agree to the conference asked by the Senate.

The SPEAKER pro tempore. Is there objection to the request of the gentleman from Colorado? The Chair hears none, and appoints the following conferees: Messrs. ASPINALL, ROGERS of Texas, HALEY, SAYLOR and BURTON of Utah.

CONSENT CALENDAR

The SPEAKER pro tempore. This is Consent Calendar day. The Clerk will call the first bill on the Consent Calendar.

ACQUISITION OF PROPERTY IN SQUARE 758 IN THE DISTRICT OF COLUMBIA

The Clerk called the bill (S. 254) to provide for the acquisition of certain property in square 758 in the District of Columbia, as an addition to the grounds of the U.S. Supreme Court Building.

Mr. GROSS. Mr. Speaker, I ask unanimous consent that the bill be passed over without prejudice.

The SPEAKER pro tempore. Is there objection to the request of the gentleman from Iowa?

There was no objection.

ADDITIONAL COMMISSIONERS OF THE U.S. COURTS OF CLAIMS

The Clerk called the bill (S. 102) to provide for additional commissioners of the U.S. Court of Claims.

Mr. FORD. Mr. Speaker, I ask unanimous consent that the bill be passed over without prejudice.

The SPEAKER pro tempore. Is there objection to the request of the gentleman from Michigan?

There was no objection.

PROTECTION OF NATIONAL FORESTS AND NATIONAL GRASSLANDS

The Clerk called the bill (H.R. 7588) to provide for enforcement of rules and regulations for the protection, development, and administration of the national forests and national grasslands, and for other purposes.

There being no objection, the Clerk read the bill as follows:

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the Act of June 4, 1897, as amended (30 Stat. 11, 35; 16 U.S.C. 551), second full paragraph, page 35, and section 32(f), title III, of the Bankhead-Jones Farm Tenant Act, as amended (50 Stat. 526; 7 U.S.C. 1011(f)), are further amended by addition of the following sentence in each case: "Any person charged with the violation of such rules and regulations may be tried and sentenced by any United States commissioner specially designated for that purpose by the court by which he was appointed, in the same manner and subject to the same conditions as provided for in title 18, United States Code, section 3401, subsections (b), (c), (d), and (e), as amended."

The bill was ordered to be engrossed and read a third time, was read the third time, and passed, and a motion to reconsider was laid on the table.

EDITH NOURSE ROGERS MEMORIAL VETERANS' HOSPITAL

The Clerk called the bill (H.R. 10926) to designate a Veterans' Administration hospital in Bedford, Mass., as the Edith Nourse Rogers Memorial Veterans' Hospital.

Mr. TEAGUE of California. Mr. Speaker, I ask unanimous consent that the bill be passed over without prejudice.

The SPEAKER pro tempore. Is there objection to the request of the gentleman from California?

There was no objection.

SAM RAYBURN MEMORIAL VETERANS CENTER

The Clerk called the bill (H.R. 10936) to designate the Veterans' Administration center at Bonham, Tex., as the Sam Rayburn Memorial Veterans Center.

Mr. TEAGUE of California. Mr. Speaker, I ask unanimous consent that the bill be passed over without prejudice.

The SPEAKER pro tempore. Is there objection to the request of the gentleman from California?

There was no objection.

JOHN ELLIOTT RANKIN MEMORIAL VETERANS HOSPITAL

The Clerk called the bill (H.R. 146) to designate the Veterans' Administration hospital at Jackson, Miss., as the John Elliott Rankin Memorial Veterans Hospital.

Mr. RYAN of New York. Mr. Speaker, I ask unanimous consent that the bill be passed over without prejudice.

The SPEAKER pro tempore. Is there objection to the request of the gentleman from New York?

There was no objection.

TRANSFER OF LAND TO MCKINNEY, TEX.

The Clerk called the bill (H.R. 10610) to provide for the conveyance of certain real property under the control of the Administrator of Veterans' Affairs.

The SPEAKER pro tempore. Is there objection to the present consideration of the bill?

Mr. FORD. Reserving the right to object, Mr. Speaker, I should like to ask the author of the bill or a member of the committee a question concerning the purpose for which this land would be used by the city of McKinney, Tex.

Do I understand correctly that in the deed of conveyance from the Federal Government to the city of McKinney there would be a reverter clause in case the land is not used for recreational purposes?

Mr. ROBERTS of Texas. That is correct.

Mr. FORD. This will be a part of the conveyance by the Federal Government to the city?

Mr. ROBERTS of Texas. That is correct. It was explained by the Veterans' Administration that he will add this provision to the conveyance.

Mr. FORD. As I understand it, it is the fact that the city of McKinney is going to use this land for recreational purposes that prompted the Veterans' Administration to transfer this land at 50 percent of the appraised value?

Mr. ROBERTS of Texas. That is correct. This is a part of the Veterans' Administration hospital and it adjoins a golf course which was built by Ben Hogan and Byron Nelson and was given to the veterans. This adjoins it and will be a municipal golf course.

Mr. FORD. I withdraw my reservation of objection, Mr. Speaker.

The SPEAKER pro tempore. Is there objection to the present consideration of the bill?

There being no objection, the Clerk read the bill, as follows:

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the Administrator of Veterans' Affairs shall be authorized to convey to the city of McKinney, Texas, at 50 per centum of its appraised value, and for recreational purposes, all right, title, and interest of the United States in and to a portion of the real property of the Veterans' Administration Hospital, McKinney, Texas, approximating thirty-nine acres, more or less. The exact legal description of such real property shall be determined by the Administrator of Veterans' Affairs and in the event a survey is required in order to make such determination the city of McKinney shall bear the expense thereof.

With the following committee amendments:

On line 9, page 1, after the word "description" insert "and the appraised value"

On line 1, page 2, after the word "survey", insert the words "or an appraisal".

On line 2, page 2, strike the word "determination" and insert the word "determinations".

At the end of the bill, add section 2 as follows:

"SEC. 2. Any deed of conveyance made pursuant to this Act shall contain such additional terms, conditions, reservations, and restrictions as may be determined by the Administrator of Veterans' Affairs to be necessary to protect the interests of the United States."

The committee amendments were agreed to.

The bill was ordered to be engrossed and read a third time, was read the third time, and passed, and a motion to reconsider was laid on the table.

TRANSFER OF SEWAGE TREATMENT PLANT TO MCKINNEY, TEX.

The Clerk called the bill (H.R. 10611) to provide for the conveyance of certain real property under the control of the Administrator of Veterans' Affairs.

The SPEAKER pro tempore. Is there objection to the present consideration of the bill?

Mr. GROSS. Mr. Speaker, reserving the right to object, I would like to make legislative history with reference to this bill. Do I understand that in the deed of conveyance for this sewage disposal plant to the municipality of McKinney, Tex., it will be provided that the Veterans' Administration hospital, after the 10 years in which sewage is to be disposed of free of charge to the Veterans' Administration, that then the Veterans' Administration will pay the minimum rate charged to all other users of the sewage disposal plant as operated by the city of McKinney, Tex.

Mr. ROBERTS of Texas. Mr. Speaker, will the gentleman yield?

Mr. GROSS. I yield to the gentleman.

Mr. ROBERTS of Texas. The gentleman is correct and I thank him very much for bringing out the fact that that provision will be included in the deed of conveyance.

Mr. GROSS. I thank the gentleman.

Mr. ROBERTS of Texas. I thank the gentleman.

Mr. GROSS. Mr. Speaker, I withdraw my reservation of objection.

The SPEAKER pro tempore. Is there objection to the present consideration of the bill?

There was no objection.

The Clerk read the bill as follows:

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the Administrator of Veterans' Affairs is authorized to convey to the city of McKinney, Texas, the sewage treatment plant of the Veterans' Administration hospital of McKinney, Texas, if the city of McKinney, Texas, in consideration therefor, agrees to treat all sewage from such hospital without charge for a period of ten years from the date of such conveyance.

With the following committee amendments:

On page 1, line 5, after the word "plant" insert "(with the easements relating thereto)".

At the end of the bill insert section 2 as follows:

"SEC. 2. Any deed of conveyance made pursuant to this Act shall contain such additional terms, conditions, reservations, and restrictions as may be determined by the Administrator of Veterans' Affairs to be necessary to protect the interests of the United States."

The committee amendments were agreed to.

The bill was ordered to be engrossed and read a third time, was read the third time, and passed, and a motion to reconsider was laid on the table.

RELATING TO THE ESTABLISHMENT OF CONCESSION POLICIES IN THE AREAS ADMINISTERED BY NATIONAL PARK SERVICE

The Clerk called the bill (H.R. 5886) relating to the establishment of concession policies in the areas administered by National Park Service and for other purposes.

Mr. McFALL. Mr. Speaker, at the request of another Member, I ask unanimous consent that this bill be passed over without prejudice.

The SPEAKER pro tempore. Without objection, it is so ordered.
There was no objection.

QUARTERS AND FACILITIES FOR GOVERNMENT PERSONNEL

The Clerk called the bill (S. 1883) to authorize Government agencies to provide quarters, household furniture and equipment, utilities, subsistence, and laundry service to civilian officers and employees of the United States, and for other purposes.

The SPEAKER pro tempore. Is there objection to the present consideration of the bill?

There being no objection, the Clerk read the bill, as follows:

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the head of the each department, independent establishment, and Government corporation may, under such regulation as the President may prescribe and where conditions of employment or availability of quarters warrant it, provide, either directly or by contract, civilian officers and employees stationed in the United States, its territories and possessions, and the Commonwealth of Puerto Rico, with quarters (Government owned or leased), household furniture and equipment, utilities, subsistence, and laundry service.

SEC. 2. Rental rates for any Government owned or leased quarters provided under authority of section 1 of this Act, or occupied on a rental basis under authority of any other provision of law, and charges for any furniture and equipment, utilities, subsistence, and laundry service made available in connection with the occupancy of such quarters, shall be based on the reasonable value thereof to the officer, employee, or member of the uniformed services concerned, in the circumstances under which furnished. Such rates and charges shall be determined in accordance with such regulations as the President may prescribe, and the amounts thereof shall

be paid by or deducted from the salary of such officer, employee, or member of the uniformed services, or otherwise charged against them: *Provided*, That the amounts of any payroll deductions for such charges shall remain in the applicable appropriation or fund, but whenever payments are made by any other method the amounts shall be credited to miscellaneous receipts of the Treasury or to such appropriation or fund as may be otherwise provided by law.

SEC. 3. Whenever, as an incidental service in support of a Government program, any Government owned or leased quarters, and any related furniture and equipment, utilities, subsistence, and laundry service are provided, under specific Government direction, to any person who is not an officer or employee of the Government or a member of the uniformed services, the rates and charges therefor, which shall be paid or otherwise credited to the Government, shall be determined in accordance with section 2 of this Act: *Provided*, That the amounts of any such charges shall be credited to miscellaneous receipts of the Treasury or to such appropriation or fund as may be otherwise provided by law.

SEC. 4. No civilian officer, employee, or member of the uniformed services shall be required to occupy Government owned or leased rental quarters unless the head of the agency concerned shall determine that necessary service cannot be rendered or property of the United States cannot be adequately protected otherwise.

SEC. 5. Section 2 of this Act shall not be construed as repealing or modifying any provision of law which may authorize the provision, without charge or at specified rates, of any of the items enumerated in section 1 of this Act, to any specific civilian officer or employee, or to any class of such officer or employees, or to such officers or employees under emergency conditions or to members of the uniformed services.

SEC. 6. Section 3 of the Act of March 5, 1928 (45 Stat. 193 (5 U.S.C. 75a)), is repealed.

With the following committee amendment:

Strike out all after the enacting clause and insert:

"That, for the purposes of this Act—

"(1) 'Government' means the Government of the United States of America.

"(2) 'agency' means—

"(A) each executive department of the Government;

"(B) each agency independent establishment in the executive branch of the Government;

"(C) each corporation owned or controlled by the Government, except the Tennessee Valley Authority; and

"(D) The General Accounting Office.

"(3) 'employee' means a civilian officer or employee of an agency.

"(4) 'United States' means the several States of the United States of America, the District of Columbia, the territories and possessions of the United States, and the Commonwealth of Puerto Rico.

"(5) 'quarters' means quarters owned or leased by the Government.

"(6) 'facilities' means household furniture and equipment, garage space, utilities, subsistence, and laundry service.

"(7) 'member' and 'uniformed services' have the meanings given them by section 101 of title 37, United States Code.

"Sec. 2. Whenever conditions of employment or of availability of quarters warrant such action, the head of each agency may provide, directly or by contract, any employee stationed in the United States, with quarters and facilities.

"Sec. 3. Rental rates for quarters provided for an employee under section 2 of this Act

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HIGHLIGHTS: Senate committee reported food stamp bill. Both Houses agreed to conference report on Interior appropriation bill. Senate debated Alaska relief bill. Sen. Pearson urged increased domestic sugar quotas. Reps. Widnall and Cramer criticized accelerated public works program under ARA. Rep. Derwinski called International Coffee Agreement a "new form of foreign aid." House committee reported Alaska relief bill. House Rules Committee cleared foreign aid appropriation bill. Conference agreed to file report on water resources research program.

SENATE

1. INTERIOR AND RELATED AGENCIES APPROPRIATION BILL, 1965. Both Houses agreed to the conference report on this bill, H. R. 10433, and acted on amendments in disagreement (pp. 14754-6, 14827-33). This bill will now be sent to the President. As agreed to the bill appropriates \$2,700,000 for the Bureau of Outdoor Recreation as proposed by the House instead of \$2,322,000 as proposed by the Senate. See Digest 129 for a summary of Forest Service items.
2. FOOD STAMPS. The Agriculture and Forestry Committee reported with amendments H. R. 10222, the food stamp bill (S. Rept. 1124). p. 14790
3. ALASKA RELIEF. Began consideration of S. 2881, to provide authorization for Federal agencies to aid Alaska in recovering from the effects of the recent earthquake and seismic waves (pp. 14833-4, 14849-54). Sen. Gruening submitted an amendment intended to be proposed to this bill (pp. 14849-64).

Sen. Bartlett commended the Office of Emergency Planning for its disaster relief work in Alaska. p. 14797

4. CIVIL DEFENSE. By a vote of 74 to 4, passed without amendment H. R. 10314, to amend the Federal Civil Defense Act so as to extend until June 30, 1968, the authority to provide financial assistance to States for necessary and essential State and local civil defense personnel and administrative expenses. This bill will now be sent to the President. pp. 14812, 14815-25
5. RECLAMATION. The Interior and Insular Affairs Committee reported with amendments S. 1123, to provide for construction of the Lower Teton division of the Teton Basin reclamation project, Idaho (S. Rept. 1127). p. 14790
Passed as reported S. 1186, to expand existing facilities of the Cooked River reclamation project, Oregon. pp. 14798-9
Passed as reported S. 368, to authorize construction of the midstate reclamation project, Nebr. pp. 14800-4
6. LANDS. The Government Operations Committee reported with amendments S. 1509, to authorize reimbursement to owners and tenants of certain lands or interests therein acquired by the U. S. for certain moving expenses, losses, and damages (S. Rept. 1126). pp. 14790-1
7. SUGAR. Sen. Pearson contended that we place too much reliance on foreign suppliers for our sugar needs and urged an increase in quotas for domestic sugar-beet producers. pp. 14795-7
8. WATER RESEARCH. Sen. Jordan, Ida., replaced Sen. Allott as a conferee on S. 2, the water resources research bill. p. 14815
9. PERSONNEL; PAY. Sen. Williams, Del., submitted an amendment intended to be proposed to H. R. 11049, the Federal pay bill. p. 14791
10. FOREIGN AID. Sen. Morse stated that he was opposed to the foreign aid authorization bill in its present form and would seek to reduce the authorization for the program. pp. 14797-8
11. ELECTRIFICATION. Sens. Mansfield, Morse, and Kuchel discussed the merits of the proposed Calif. intertie for the distribution of electric power in the West. pp. 14791-2
Sen. Church criticized the refusal of a House committee to appropriate funds for a transmission line to carry surplus public power to and from southern Idaho. pp. 14862-3
12. FOREIGN TRADE. Both Houses received from Commerce the annual report of the Foreign-Trade Zones Board. pp. 14787, 14790
13. LEGISLATIVE PROGRAM. Sen. Mansfield stated that the food stamp and Alaska relief bills will be considered Tues., the pay bill on Wed., and the road authorization bill on Thurs. if the latter is reported. pp. 14793-4

HOUSE

14. TAXATION. Received the conference report on H. R. 11376, to provide a one-year extension of certain excise-tax rates (H. Rept. 1523). pp. 14787, 14752-3
Passed as reported H. R. 4649, to authorize the use of certain volatile fruit-flavor concentrates in the cellar treatment of wine (p. 14760); H. R. 7267, as reported, to authorize partial refunds of gasoline taxes directly to

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to aerial applicators with respect to gasoline used by them in providing services to farmers in farming operations (p. 14762-3); and H. R. 7307, as reported, to amend the Internal Revenue Codes with respect to the apportionment of the depletion allowance between parties to contracts for the extraction of minerals or the severance of timber (p. 14764).

15. ALASKA RELIEF. The Interior and Insular Affairs Committee reported with amendment H. R. 11438, to provide assistance to Alaska for the reconstruction of areas damaged by the recent earthquake and seismic waves (H. Rept. 1521). p. 14787
16. APPROPRIATIONS. The Rules Committee reported a resolution waiving points of order on H. R. 11812, the foreign aid appropriation bill. p. 14787
17. WATER RESEARCH. The "Daily Digest" states that conferees agreed to file a report on S. 2, to establish water resources research centers at land-grant colleges and State universities. p. D525
18. WATERSHEDS. Received from the Budget Bureau plans for works of improvement on the following watersheds: p. 14787
Marshyhope Creek, Del. and Md., Mill Creek, Ga., Turtle River, Ga., and Wellington-Napoleon, Mo.; to Agriculture Committee.
Hiawassee River, Ga., Muddy Creek, Kans., Presque Isle Stream, Me., and West Fork Duck Creek, O.; to Public Works Committee.
19. TRAVEL; PERSONNEL. Received from GAO a report "on a review relating to disclosing that ineffective administration and control of travel advances and purchase of transportation for employees for travel expenses had been extended during periods in which the employees either did not travel or performed only limited travel." p. 14787
20. MEAT IMPORTS. Received a La. Legislature resolution urging the President and the Congress "to take immediate action to stop the importation of foreign meat into this country." p. 14788
21. MILITARY CONSTRUCTION. Disagreed to Senate amendment to H. R. 10300, to authorize certain construction at military installations and appointed conferees. Senate conferees have already been appointed. p. 14753
22. RESEARCH. Disagreed to Senate amendments to H. R. 4364, to provide for the free entry of one mass spectrometer for Oregon State University and one mass spectrometer for Wayne State University and appointed conferees. Senate conferees have not yet been appointed. p. 14756-7
23. FORESTRY. Passed as reported H. R. 9634, to authorize the Secretary of Defense to lend certain equipment and provide certain services to the Girl Scouts of America for the 1965 Senior Girl Scout roundup. p. 14758
24. FOREIGN AID. Rep. Mahon expressed pleasure that the foreign assistance estimated funds for fiscal 1965 are "the lowest in 9 years." p. 14768
Rep. Passman inserted fact sheets and tabulations covering the foreign aid program for the past 9 years. pp. 14768-71
25. AREA REDEVELOPMENT. Received a letter from the Comptroller General, transmitting a report on an examination of the administration of the accelerated public works program by the Area Redevelopment Administration, Department of Commerce, and other Federal agencies, "revealing that grants of over \$21 mil-

tion had been made for 85 projects in areas which were no longer burdened by conditions of substantial unemployment at the time the grants were consummated; to Government Operations Committee. p. 14787

Reps. Widnall and Cramer discussed the GAO report and stated that "there is no indication whatsoever that the administration officials are willing to concede that the intent of Congress is being violated, much less put any simple reforms into practice." pp. 14776-80, 14784

Rep. Talcott criticized ARA programs and stated that Congress should investigate its purposes and real accomplishments. p. 14780

26. COFFEE. Rep. Derwinski criticized the International Coffee Agreement as being "foreign aid without congressional approval." pp. 14781-3

ITEMS IN APPENDIX

27. SALT. Extension of remarks of Rep. Dole commending the Salt Institute for its work in helping to develop new ways salt can be helpful to industry, in agriculture and in a broadening range of facets of everyday living. pp. A3527-8
28. COTTON. Extension of remarks of Rep. Beermann stating that "A great deal of the opposition to the cotton-wheat bill arose because some believed it would socialize the cotton industry," commenting on the resignation of Dr. Cochrane and inserting an article on the closing of the New Orleans Cotton Exchange. p. A3546
29. WILDERNESS. Rep. Reuss inserted an editorial endorsing the wilderness bill. pp. A3550-1

COMMITTEE HEARINGS:

- June 30: Proposed Public Land Review Commission, S. Interior (Baker to testify). Forest land transfers in Lassen National Forest, Calif., and in Cocke Co., Tenn., H. Agriculture (Grover, FS, to testify).
Agricultural appropriation bill, S. Appropriations.
Poverty program, S. Labor and Public Welfare (exec).
Civil rights bill, H. Rules.
- July 1: Reimbursement for overtime for inspection services, H. Agriculture (Johnston, ARS, to testify).
Release of FHA rights in land in Pender Co., N. C., H. Agriculture (Allman, FHA, and Broderson, OGC, to testify).

labor costs and to some extent the difference in materials and finished shipboard equipment.

In 1960, in 1961, and again in 1962 amendments to the Merchant Marine Act of 1936 have been enacted extending the original construction-differential subsidy ceiling of 50 percent. I vigorously opposed the enactment of these previous rate extension amendments and I must reiterate my opposition to the present bill, H.R. 10053.

The need for these extensions has been caused by the growing difference between United States and foreign shipbuilding costs. While the original act provided subsidies to bridge the large gap between foreign and domestic costs, it is unreasonable for the Government to accept the entire burden of the ever-increasing cost differentials. The annual expenditures for ship construction subsidies have risen from \$16,379,076 in 1957 to \$90,514,302 in 1963.

In spite of this increase, during the same period expenditures to cover operation-differential subsidies have risen from \$108,292,274 to \$220,676,685. Total ship construction and reconstruction subsidy expenditures between 1936 and 1963 have been \$659,512,385 while the total operating subsidies have been \$1,532,443,081 in the same period. Individual ship construction subsidy rates have risen from approximately 45 percent in 1957 to the present range of 53 to 55 percent. During this same period the shipbuilding costs in the United States have risen some 12 to 15 percent, with the expectation of a minimum 2-percent increase per year. While the actual ship selling prices have not increased at the same rate, due to somewhat improved productivity of the shipyards, nevertheless shipbuilding prices are continuing to rise at a faster rate than foreign prices so that the price differentials will shortly exceed the presently proposed limits.

I am opposed to the further extension of this 55 and 60 percent authority because, as I stated in 1962, it is my firm conviction that it provides an extra incentive to interested parties to press for the highest differential percentages obtainable.

I believe that the Government should establish a limit in which it will participate to retain a strong and economic merchant marine. This limit should certainly not exceed the original 50-percent ceiling as established in the original Merchant Marine Act of 1936 and serious efforts should be made to reduce the subsidies further.

Shipping costs—and especially shipbuilding costs—in the United States have risen to where they are positive threats to the future of U.S. shipping. The adequacy of our merchant fleet today has been in large measure hampered by the shipyard subsidy that gives us but one ship for every two built by other maritime nations for the same cost. I consider that these high ceiling extensions will boost rather than encourage reductions in high construction and reconstruction costs in the U.S. shipyards. The best incentive for lowering costs would be to deny extension of the 50-percent ceiling.

We must distinguish between our shipping and our shipbuilding needs. Until it is demonstrated that our national defense or economic needs require 21 major shipyards (now operating at 42 percent of capacity) we should not legislate that all American ships must be built in this country. Most of our commercial yards are principally supported by Navy contracts representing in excess of \$1 billion of unfinished shipbuilding work as of January 1964. The 17 to 18 commercial merchant ships under the Maritime Administration's program contribute relatively little to sustaining these yards. If they can compete for this work—with 50 percent of the cost being paid by the Government—well and good. If 50 percent is not enough, I

believe we should seriously reevaluate whether we can afford, or need, such a shipyard subsidy program.

There are a number of things available within the shipbuilding complex to lower the cost of construction of ships. For the shipyard management there is the need to continue improving shipbuilding techniques. For the shipyard unions there is the need to simplify work rules. For the shipowner there is the need to standardize ships and components. This would assuredly lead to greater productivity and lower cost.

Continuing rise in labor costs and the increasing disparity between the U.S. and foreign hourly earnings should concern all of us. Shipyard labor costs vary over a wide range as shown below (average hourly earnings in U.S. dollars):

Country	Year		Increase
	1959	1962	
United States.....	\$2.68	\$3.01	\$0.33
Japan.....	.66	.73	.07
Netherlands.....	.76	1.00	.24
Germany.....	.79	1.03	.29
United Kingdom.....	.82	.96	.14
Sweden.....	1.42	1.69	.27

Of particular interest is the fact that Sweden, which has the highest wage rate in Europe, constructs ships at a lower price than the United Kingdom, at one time the leading shipbuilding country in the world, and constructs ships at about the same price as Germany. This competitive capability was strongly influenced by a recent change in the shipyard work rules permitting more liberalized job interchangeability, which substantially increased productivity and resulted in insuring continued employment and retaining the more highly skilled workmen.

The subsidized shipowners have a substantial responsibility in lowering the operating cost of their ships. The seafaring unions must also contribute to increase productivity so as to enable the United States to maintain an economic and competitive merchant marine rather than continuing to rely on increased subsidies. It is ironic that the United States, which is able to compete internationally with so many commodities, is unable to even reduce to any degree the difference that exists between American and foreign shipbuilding costs.

The Maritime Administrator had asked for a 1-year extension limit on the premise that this would provide greater flexibility pending the outcome of his present studies relating to methods of computing the construction-differential subsidies and pending the outcome of other basic issues in the maritime program. It is gratifying to also note from the testimony that the Administrator is undertaking a program to reduce costs of building ships and to make the industry more nearly competitive in the world.

The maritime subsidy program is becoming more and more costly. The emphasis in the maritime industry must be on attaining an economic and competitive merchant marine with decreasing subsidy. H.R. 10053 should be rejected by the Senate.

Mr. LAUSCHE. Mr. President, I ask unanimous consent that the Senator from Delaware [Mr. WILLIAMS] be permitted to add his name as a cosponsor of my amendment.

The PRESIDING OFFICER. Without objection, it is so ordered.

Mr. WILLIAMS of Delaware. Mr. President, a number of years ago I joined the Senator from Ohio in opposing the raise to 55 percent. I am glad that he

has offered his amendment to hold the extension down to 1 year, with the understanding that before the year expires the Maritime Administration will have completed its study and submitted its report. Otherwise I would object to any further extension.

Mr. BARTLETT. The House of Representatives has already passed a bill for a 2-year extension.

It is true, as the Senator from Ohio [Mr. LAUSCHE] said, that the Maritime Administration urged that the act be extended for only 1 year, a recommendation in which the Senate has now acquiesced by its acceptance of the amendment offered by the Senator from Ohio. Since the existing law will expire on July 1, I am hopeful that the House, in the light of all the circumstances, will agree to the Senate amendment.

The PRESIDING OFFICER. The bill is open to further amendment. If there be no further amendment to be proposed, the question is one the engrossment of the amendment and the third reading of the bill.

The amendment was ordered to be engrossed and the bill to be read a third time.

The bill (H.R. 10053) was read the third time, and passed.

Mr. MANSFIELD. Mr. President, I move that the Senate reconsider the vote by which the bill was passed.

Mr. BARTLETT. I move to lay that motion on the table.

The motion to lay on the table was agreed to.

CHANGE OF CONFERENCE ON S. 2, WATER RESOURCES RESEARCH BILL

Mr. MANSFIELD. Mr. President, due to an absence from the city, the senior Senator from Colorado [Mr. ALLOTT] is unable to serve as a conferee on S. 2, the water resources research bill. A conference has been scheduled on the proposed legislation for this afternoon. It has been suggested by Senator ALLOTT that the Senator from Idaho [Mr. JORDAN] replace him as a conferee. This has the approval of the chairman and the ranking minority member of the Committee on Interior and Insular Affairs. Therefore, I ask unanimous consent that the Senator from Idaho be named as a conferee on S. 2 in lieu of the Senator from Colorado.

The PRESIDING OFFICER. Without objection, it is so ordered.

AMENDMENT OF FEDERAL CIVIL DEFENSE ACT OF 1950

Mr. MANSFIELD. Mr. President, what is the pending business?

The PRESIDING OFFICER. If there is no objection, the Chair lays before the Senate the unfinished business.

The Senate resumed the consideration of the bill (H.R. 10314) to further amend the Federal Civil Defense Act of 1950, as amended, to extend the expiration date of certain authorities thereunder, and for other purposes.

Mr. INOUE. Mr. President, the Committee on Armed Services, to whom was referred the bill (H.R. 10314) to further amend the Federal Civil Defense Act of 1950, as amended, to extend the expiration date of certain authorities thereunder, and for other purposes, having considered the same, report favorably thereon without amendment and recommend that the bill do pass.

This bill would extend for 4 years three civil defense authorities that otherwise would expire on June 30, 1964. These authorities—

First, provide for 50 percent contributions to States and local governments toward the cost of personnel and administrative expenses for federally approved civil defense programs;

Second, provide payments for travel and per diem expenses of trainees at civil defense schools; and

Third, permit procurement and maintenance of radiological equipment and the granting or lending of this equipment to States.

Mr. President, I ask unanimous consent to have printed at this point in the RECORD that part of the committee report which relates to the background of the bill.

There being no objection, the excerpt was ordered to be printed in the RECORD, as follows:

Before the 1958 amendments to the Federal Civil Defense Act of 1950, responsibility for civil defense was vested primarily in the States and their political subdivisions with the Federal contribution being limited basically to coordination and guidance.

Public Law 85-606, approved August 8, 1958, made some important changes to the basic law. Among them were—

(1) Responsibility for civil defense was vested jointly in the Federal Government and the several States and their political subdivisions;

(2) The Federal Government was authorized to purchase radiological instruments and detection devices and to grant them to the States;

(3) A limitation of \$100,000 on amounts authorized to be appropriated annually for travel expenses and per diem allowances of persons attending civil defense schools was increased to \$300,000, but States were required to pay one-half of these expenses;

(4) Federal financial contributions to States for civil defense personnel and administrative expenses and personal equipment for State and local civil defense workers were authorized.

The last three of these changes were made effective only through June 30, 1964. This bill would extend the effective date of these authorities for 4 years.

Mr. INOUE. Mr. President, a few weeks ago, the Governors of the several States held their 1964 Governors' Conference in Cleveland, Ohio. At that time, a strong favorable report was made by the Governors—incidentally, it was unanimously agreed to—commending the Civil Defense Agency, and also recommending that civil defense activities be carried on in the United States. I wish to quote one sentence from the report:

The conference recommends as imperative the enactment before June 30, 1964, by the Congress, of H.R. 10314, which extends the expiring matching fund provisions of the Federal Civil Defense Act.

Mr. President, I ask unanimous consent to have printed at this point in the RECORD excerpts from the report, and also the complete report of the Governors' Conference, together with a presentation by Governor Egan, of Alaska, on March 27, 1964.

The excerpts, the report, and the presentation by Governor Egan were ordered to be printed in the RECORD, as follows:

GOVERNORS' SUPPORT

Letters from individual Governors to your committee, supplemented by the reports we have received from the Department of Defense and the Office of Emergency Planning, all underscore the steady and continuing progress made this past year toward an effective civil defense program throughout the Nation.

Rewarding as this progress continues to be, it still falls far short of the program which this conference has persistently urged as the essential minimum required by the realities of the nuclear age if we are to meet our personal responsibility as Governors for the safety of our citizens.

1. *Resolved*, That the report of the committee on civil defense and postattack recovery endorsing an expanded civil defense effort by all levels of government, be and it hereby is, adopted and that a copy of that report, together with a copy of these resolutions, be transmitted by the chairman of the Governors' Conference to the President of the United States and to the chairman of the Armed Services Committees and the Appropriations Committees of the House and Senate of the U.S. Congress;

2. *Further resolved*, That the Governors' Conference recommends that the Congress give the President's civil defense program, built around fallout shelters, a firm and high priority as an integral part of the national security effort;

"5. *Further resolved*, That the conference recommends as imperative the enactment before June 30, 1964, by the Congress of H.R. 10314, which extends the expiring matching fund provisions of the Federal Civil Defense Act."

EXCERPTS FROM PRESENTATION BY GOVERNOR EGAN ON THE ALASKAN EARTHQUAKE

Mr. Chairman and fellow Governors, as the committee on civil defense and post-attack recovery has stated, the capability of civil defense to perform under disaster conditions was critically tested by the earthquake in Alaska in March. The civil defense organization in Alaska passed this test with flying colors. It coordinated the rescue and relief activities and acted as a center for liaison with military forces and civil defense heads. Communications and other equipment purchased with Federal financial assistance provided the vital link between State and local governments and the disaster areas in need.

The State civil defense and local units of civil defense worked in such a manner that they command the respect of all Alaskans at this time.

I can only hope that, because of the magnitude of the disaster in Alaska, people all over these United States of ours recognize the need for a strong civil defense organization does not only exist with relation to a nuclear holocaust, God forbid, that may some day be thrust upon us, but in overcoming the disastrous results of natural disaster.

If a holocaust ever comes where nuclear weapons are involved, we will be much, much better able to cope with the results of such a disaster, which we all hope will never be, with the kind of civil defense organization

that is vitally necessary. I think that it would behoove all citizens of the United States over a 2- or 3-year period to take a day or two off and become active in their local civil defense organization in the particular local community in which they reside so that they will have some good working understanding of what their duties might be if a natural disaster or other disaster ever befalls their particular area where such an organization is needed.

REPORT OF GOVERNORS' CONFERENCE COMMITTEE ON CIVIL DEFENSE AND POSTATTACK RECOVERY

Letters from individual Governors to your committee, supplemented by the reports we have received from the Department of Defense and the Office of Emergency Planning, all underscore the steady and continuing progress made this past year toward an effective civil defense program throughout the Nation.

Rewarding as this progress continues to be, it still falls far short of the program which this conference has persistently urged as the essential minimum required by the realities of the nuclear age if we are to meet our personal responsibility as Governors for the safety of our citizens.

RECENT STATE AND LOCAL PROGRESS

Progress has been made in the past 12 months on a number of fronts: on the construction of protected emergency operating centers to assure continuity of State and local government in the event of a nuclear emergency, on training, on resources planning, and on the marking and stocking of available fallout shelters.

Thirty-nine of the reporting States now have emergency operating centers (EOC's) with some degree of protection, as compared to the 24 last reported. At the county level, also, progress in EOC construction is continuing. Hawaii reports 75 percent of its counties with protected EOC's, Pennsylvania 40 percent. Although all reports show some effort by individual counties, a great deal still remains to be done in most States to insure continuity of the local government function in a nuclear emergency.

The Federal university extension program for training CD instructors was widely put into effect last year. A number of States, while endorsing the program, however, express concern that in its establishment, State civil defense authorities were bypassed. These States feel that better results, at lower overall cost, could have been achieved by accepting the appropriate State agency as a full partner in the program's implementation.

The comprehensive emergency resources planning program is also receiving active support. Many States have already applied to the Federal Government for funds to assist in the employment of personnel for this project. Others are conducting a planning program with their own funds. Only one State, Alaska, reports its inability to pursue the program, due to the disruptions caused by the March 27 earthquake.

Hawaii, on the other hand, reports that its entire emergency planning program is already 85-percent complete.

During the past year the Federal marking and stocking shelter program, similarly, made satisfactory progress. Vermont reports that it has achieved 124 percent of its shelter stocking goal. Connecticut will complete its program during June 1964. In some States, however, delays in transporting shelter stocks are occurring, due to lack of local funds and the consequent need to rely on the relatively few volunteer workers available.

was given by John Macy, Chairman, Civil Service Commission; a representative of the Department of Agriculture; and representatives of employee organizations.

SOCIAL SECURITY AMENDMENTS

Committee on Ways and Means: Met in executive session to consider a draft of language to carry out decisions made by the committee on social security amendments on June 24. The committee will continue its executive consideration Tuesday, June 30.

Joint Committee Meetings

EXCISE TAX EXTENSION

Conferees, in executive session, agreed to file a conference report on the differences between the Senate- and House-passed versions of H.R. 11376, providing a 1-year extension of certain excise-tax rates. As agreed by the conferees, the Senate would recede from all of its amendments, with the exception of the Williams (Delaware) amendment to treat losses arising from Cuban confiscation of American property (both intangible and tangible) as casualties for tax purposes—with the effective date applicable to such losses sustained in tax years ending after December 31, 1958.

WATER RESOURCES

Conferees, in executive session, agreed to file a conference report on the differences between the Senate- and House-passed versions of S. 2, to promote a more adequate national program of water research.

COMMITTEE MEETINGS FOR TUESDAY, JUNE 30

(All meetings are open unless otherwise designated)

Senate

Committee on Appropriations, subcommittee, on H.R. 11202, Agriculture appropriations, to hear public witnesses on funds for REA, 10 a.m., 1114 New Senate Office Building.

Subcommittee, on H.R. 10809, Labor-HEW appropriations, to hear public witnesses on funds for the NIH, 10 a.m., 1223 New Senate Office Building.

Subcommittee, on H.R. 11296, independent offices appropriations, 10 a.m., room S-128, Capitol.

Subcommittee, on H.R. 11134, State, Justice, Commerce appropriations, on funds for the Commerce Department, 10 a.m., room S-126, Capitol.

Committee on Finance, on H.R. 8000, proposed Interest Equalization Tax Act, 10 a.m., 2221 New Senate Office Building.

Committee on Foreign Relations, executive, to receive a briefing from former Ambassador to Vietnam Lodge, and to consider the nominations of Gen. Maxwell Taylor, to be Ambassador to Vietnam, and Samuel Gilstrap, to be Ambassador to Malawi (members of the Senate Committee on Armed Services are invited to attend), 10 a.m., room S-116, Capitol.

Committee on Interior and Insular Affairs, Public Lands Subcommittee, on H.R. 8070, establishing a Public Land Law Re-

view Commission to study existing laws relating to administration of public lands, 10 a.m., 3110 New Senate Office Building.

Committee on the Judiciary, subcommittee, on the nomination of Edmund Port, to be U.S. district judge for the northern district of New York, 10 a.m., 2228 New Senate Office Building.

Full committee, executive, on committee business, 10:30 a.m., 2300 New Senate Office Building.

Antitrust and Monopoly Subcommittee, executive, on S. 1182 and 2391, professional sports bills, and S. 1815 and 1935, price discrimination bills, 9:30 a.m., 2228 New Senate Office Building.

Committee on Labor and Public Welfare, Select Subcommittee on Poverty, executive, on S. 2642, proposed Economic Opportunity Act, 10 a.m., 4232 New Senate Office Building.

Committee on Public Works, Special Subcommittee on Air and Water Pollution, on air pollution problems, 9 a.m., 4200 New Senate Office Building.

Committee on Rules and Administration, executive, to continue consideration of draft of its final report on study of financial and business activities of Senate employees and former Senate employees, 9:30 a.m., 310 Old Senate Office Building.

House

Committee on Agriculture, Subcommittee on Forests, on H.R. 10069, to authorize exchange of lands adjacent to Lassen National Forest; H.R. 9179 and S. 2211, to authorize the Secretary of Interior to accept transfer of certain national forest lands, 10 a.m., 1310 Longworth House Office Building.

Committee on Armed Services, Subcommittee on Research and Development, executive, to continue a review of V/STOL programs, 10 a.m., 304 Cannon House Office Building.

Subcommittee on Military Hospital Construction, on military hospital facilities, 9 a.m., 313-A Cannon House Office Building.

Committee on Banking and Currency, on H.R. 10668, to amend the Bank Holding Company Act of 1965, 9:30 a.m., 1301 Longworth House Office Building.

Committee on Education and Labor, executive, on H.R. 9824, to extend the Fair Labor Standards Act, 9:45 a.m., 429 Cannon House Office Building.

Special Subcommittee on Education, to continue executive consideration of H.R. 9846, the National Defense Education Act Amendments, to follow the full committee meeting, 429 Cannon House Office Building.

Committee on Foreign Affairs, Subcommittee on the Far East and the Pacific, executive, to hear Gen. Paul D. Harkins, 10 a.m., H-322 U.S. Capitol Building.

Subcommittee on the Far East and the Pacific, executive, to meet with visiting delegation of Korean Congressmen, visiting the U.S. under the auspices of the Foreign Leader Program of the Department of State, 2:30 p.m., H-322 U.S. Capitol Building.

Committee on Government Operations, Subcommittee on Legal and Monetary Affairs, regarding coin shortage, 10 a.m., B-300 Rayburn House Office Building.

Committee on Interior and Insular Affairs, Subcommittee on National Parks, executive, on H.R. 7107, re Fire Island National Seashore, N.Y., 9:45 a.m., 1324 Longworth House Office Building.

Committee on Interstate and Foreign Commerce, executive, on pending legislation, 10 a.m., 1334 Longworth House Office Building.

Committee on the Judiciary, Subcommittee No. 1, on public immigration legislation, 10 a.m., 326 Cannon House Office Building.

Committee on Merchant Marine and Fisheries, Subcommittee on Oceanography, to continue hearings on oceanography, 10 a.m., 219 Cannon House Office Building.

Committee on Post Office and Civil Service, Subcommittee on Manpower Utilization, to continue hearings on the use of military personnel and of contractor employees to perform work handled by Government civilian personnel, 10 a.m., 215 Cannon House Office Building.

Committee on Rules, full committee, to consider H. Res. 789 (to provide for the concurrence of the House of Representatives to the Senate amendments to H.R. 7125, the civil rights bill), 10:30 a.m., H-313 U.S. Capitol Building.

Committee on Ways and Means, executive, to continue the consideration of a draft of language to carry out decisions made

by the committee on social security amendments on June 24, 10 a.m., committee room, Longworth House Office Building.

Joint Committees

Joint Committee on Atomic Energy, Subcommittee on Agreements for Cooperation, to hold hearings on agreements for cooperation on peaceful uses of atomic energy with seven countries, 2 p.m., room AE-1, Capitol.

Conferees, executive, on H.R. 10456, NASA authorizations for fiscal 1965, 1:30 p.m., 235 Old Senate Office Building.



Congressional Record

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House June 30, 1964

5. TAXATION. Both Houses agreed to the conference report on H. R. 11376, to provide a one-year extension of certain excise-tax rates. This bill will now be sent to the President. pp. 14926-31, 14955-6
6. TRANSPORTATION. By a vote of 47 to 36, agreed to the House amendment to S. 6, the proposed Urban Mass Transportation Act of 1964. This bill will now be sent to the President. pp. 14931-2, 14935-49
7. LANDS. Passed as reported S. 1509, to authorize reimbursement to owners and tenants of certain lands or interests therein acquired by the U. S. for certain moving expenses, losses, and damages. pp. 14949-50
8. RECLAMATION. Passed as reported S. 1123, to provide for construction of the lower Teton division of the Teton Basin project, Idaho. pp. 14950-2
9. NOMINATION. Received the nomination of John A. Schnittker to be a member of the CCC Board of Directors. p. 14953
10. APPROPRIATIONS. Sen. Johnston submitted an amendment intended to be proposed to H. R. 11202, the agricultural appropriation bill, to provide that after July 1, 1964, appropriations available for classing or grading cotton without charge to producers shall be available for providing micronaire readings on cotton without charge to producers and to authorize transfer of CCC funds for this purpose. p. 14885
11. ESTES INVESTIGATION. At the request of Sen. McClellan, the Government Operations Committee was granted an extension until Sept. 30, 1964, to file a report on the Bilie Sol Estes investigation. p. 14883
12. PERSONNEL. Sen. McCarthy commended the public service of Williard W. Cochrane, for Director of Agricultural Economics. pp. 14895-6
Both Houses received from the State Department a proposed bill "to encourage and facilitate details and transfers of Federal employees for service with international organizations"; to H. Foreign Affairs and S. Foreign Relations Committees. pp. 14883, 15022
13. ELECTRIFICATION. Received from the Administrator of REA reports on the approval of a loan to the Colorado-Ute Electric Association, Inc., Montrose, Colo., for \$5,352,000 and a loan to the Golden Valley Electric Association, Inc., Fairbanks, Alaska, for \$18,930,000; to Appropriations Committee. p. 14883
Sen. Lausche discussed and inserted several items on the development of nuclear power for civilian purposes. pp. 14889-92
Sen. Jackson reviewed and inserted several items on the proposed plan for joint Government-industry development of an electric-power intertie between the Pacific Northwest and Southwest. pp. 14896-9

HOUSE

14. APPROPRIATIONS. Began debate on H. R. 11812, the foreign aid appropriation bill. Previously adopted by a vote of 222 to 162, a resolution waiving points of order on the bill. pp. 14959-96
15. CIVIL RIGHTS. The Rules Committee reported a resolution to concur in the Senate amendments to H. R. 7152, the civil rights bill. p. 14996

16. TRAVEL; PERSONNEL. The Rules Committee reported without amendment H. Res. 792, to grant additional travel authority to the Agriculture Committee (H. Rept. 1528). p. 14996
17. FARM LABOR. Rep. Talcott inserted a letter from the City Council of King City, Calif., discussing farm labor problems and urging the delaying of the elimination of braceros. pp. 15007-8
18. FOREIGN TRADE. Rep. Udall stated that he does not "endorse sweeping changes in the Trade Expansion Act" but joins "in the expression of concern that tariff negotiations proceed with caution...and attention to the interests of America's producers as well as its consumers." p. 15011
19. MUSHROOM INDUSTRY. Received a Pa. State Legislature memorial urging action to protect the declining domestic mushroom industry. p. 15024
20. FOREST LANDS. A subcommittee of the Agriculture Committee voted to report to the full committee H. R. 10069, to authorize exchange of lands adjacent to the Lassen National Forest, Calif., and S. 2218, to authorize the Secretary of the Interior to accept certain national forest lands in Cocke County, Tenn. p. D530
21. ELECTRIFICATION. The Interstate and Foreign Commerce Committee voted to report (but did not actually report) H. R. 9752, with amendment, to preserve the jurisdiction of the Congress over construction of hydroelectric projects on the Colorado River. p. D531
22. CONTAINERS. The Interstate and Foreign Commerce Committee voted to report (but did not actually report) H. R. 5673, with amendment, the proposed Steel Shipping Container Identification Act. p. D531
23. WATER RESEARCH. Received the conference report on S. 2, the proposed "Water Resources Research Act of 1964" (H. Rept. 1526). Authorizes appropriations rising to \$100,000 annually to assist each State in establishing a water research agency, generally the land-grant college. Authorizes appropriations to the Interior Department of \$1,000,000 for 1965, rising to \$5,000,000 for 1969 and succeeding years, to aid these agencies on a dollar-for-dollar matching basis. Authorizes appropriation of \$1,000,000 annually for 10 years to Interior to assist other educational institutions in water research, subject to veto by the Interior and Insular Affairs Committees. Requires Interior to obtain advice and cooperation from other Federal water agencies and not to duplicate their work. Provides for a Government-wide center to catalog current and projected water-resources research. Requires the President to coordinate water-research programs. pp. 14997-8

ITEMS IN APPENDIX

24. FEDERAL-STATE RELATIONS. Extension of remarks of Sen. Mundt inserting an article written by Idaho Gov. Smylie "pointing up some problems of the smaller States in their contemporary relationships with the Federal Government...and urging that States be given a greater voice in the coordinated planning of Federal-State-local cooperative programs." pp. A355-7
25. ELECTRICIFICATION; POVERTY. Extension of remarks of Rep. Saylor suggesting ways to aid the Appalachian area by restricting residual oil imports, reject further proposals to build uneconomic hydroelectric plants and stop Federal subsidies for atomic electric power. pp. A 3568-9

WATER RESOURCES RESEARCH CENTER

JUNE 30, 1964.—Ordered to be printed

Mr. ASPINALL, from the committee of conference, submitted the following

CONFERENCE REPORT

[To accompany S. 2]

The committee of conference on the disagreeing votes of the two Houses on the amendments of the House to the bill (S. 2) to establish water resources research centers at land-grant colleges and State universities, to stimulate water research at other colleges, universities, and centers of competence, and to promote a more adequate national program of water research, having met, after full and free conference, have agreed to recommend and do recommend to their respective Houses as follows:

That the Senate recede from its disagreement to the amendment of the House to the text of the bill, and agree to the same with an amendment as follows:

In lieu of the matter inserted by the House amendment insert the following: *That (a) this Act may be cited as the "Water Resources Research Act of 1964."*

(b) In order to assist in assuring the Nation at all times of a supply of water sufficient in quantity and quality to meet the requirements of its expanding population, it is the purpose of the Congress, by this Act, to stimulate, sponsor, provide for, and supplement present programs for the conduct of research, investigations, experiments, and the training of scientists in the fields of water and of resources which affect water.

TITLE I—STATE WATER RESOURCES RESEARCH INSTITUTES

SEC. 100. (a) *There are authorized to be appropriated to the Secretary of the Interior for the fiscal year 1965 and each subsequent year thereafter sums adequate to provide \$75,000 to each of the several States in the first year, \$87,500 in each of the second and third years, and \$100,000 each year thereafter to assist each participating State in establishing and*

carrying on the work of a competent and qualified water resources research institute, center, or equivalent agency (hereinafter referred to as "institute") at one college or university in that State, which college or university shall be a college or university established in accordance with the Act approved July 2, 1862 (12 Stat. 503), entitled "An Act donating public lands to the several States and territories which may provide colleges for the benefit of agriculture and the mechanic arts" or some other institution designated by Act of the legislature of the State concerned: *Provided*, That (1) if there is more than one such college or university in a State, established in accordance with said Act of July 2, 1862, funds under this Act shall, in the absence of a designation to the contrary by act of the legislature of the State, be paid to the one such college or university designated by the Governor of the State to receive the same subject to the Secretary's determination that such college or university has, or may reasonably be expected to have, the capability of doing effective work under this Act; (2) two or more States may cooperate in the designation of a single interstate or regional institute, in which event the sums assignable to all of the cooperating States shall be paid to such institute; and (3) a designated college or university may, as authorized by appropriate State authority, arrange with other colleges and universities within the State to participate in the work of the institute.

(b) It shall be the duty of each such institute to plan and conduct and/or arrange for a component or components of the college or university with which it is affiliated to conduct competent research, investigations, and experiments of either a basic or practical nature, or both, in relation to water resources and to provide for the training of scientists through such research, investigations, and experiments. Such research, investigations, experiments, and training may include, without being limited to, aspects of the hydrologic cycle; supply and demand for water; conservation and best use of available supplies of water; methods of increasing such supplies; and economic, legal, social, engineering, recreational, biological, geographic, ecological, and other aspects of water problems, having due regard to the varying conditions and needs of the respective States, to water research projects being conducted by agencies of the Federal and State Governments, the agricultural experiment stations, and others, and to avoidance of any undue displacement of scientists and engineers elsewhere engaged in water resources research.

SEC. 101. (a) There is further authorized to be appropriated to the Secretary of the Interior for the fiscal year 1965 and each subsequent year thereafter sums not in excess of the following: 1965, \$1,000,000; 1966, \$2,000,000; 1967, \$3,000,000; 1968, \$4,000,000; and 1969 and each of the succeeding years, \$5,000,000. Such moneys when appropriated, shall be available to match, on a dollar-for-dollar basis, funds made available to institutes by States or other non-Federal sources to meet the necessary expenses of specific water resources research projects which could not otherwise be undertaken, including the expenses of planning and coordinating regional water resources research projects by two or more institutes.

(b) Each application for a grant pursuant to subsection (a) of this section shall, among other things, state the nature of the project to be undertaken, the period during which it will be pursued, the qualifications of the personnel who will direct and conduct it, the importance of the project to the water economy of the Nation, the region, and the State concerned, its relation to other known research projects theretofore pursued or currently being pursued, and the extent to which it will provide oppor-

tunity for the training of water resources scientists. No grant shall be made under said subsection (a) except for a project approved by the Secretary, and all grants shall be made upon the basis of the merit of the project, the need for the knowledge which it is expected to produce when completed, and the opportunity it provides for the training of water resources scientists.

SEC. 102. Sums available to the States under the terms of sections 100 and 101 of this Act shall be paid to their designated institutes at such times and in such amounts during each fiscal year as determined by the Secretary, and upon vouchers approved by him. Each institute shall have an officer appointed by its governing authority who shall receive and account for all funds paid under the provisions of this Act and shall make an annual report to the Secretary on or before the 1st day of September of each year, on work accomplished and the status of projects underway, together with a detailed statement of the amounts received under any of the provisions of this Act during the preceding fiscal year, and of its disbursement, on schedules prescribed by the Secretary. If any of the moneys received by the authorized receiving officer of any institute under the provisions of this Act shall by any action or contingency be found by the Secretary to have been improperly diminished, lost, or misapplied, it shall be replaced by the State concerned and until so replaced no subsequent appropriation shall be allotted or paid to any institute of such State.

SEC. 103. Moneys appropriated pursuant to this Act, in addition to being available for expenses for research, investigations, experiments, and training conducted under authority of this Act, shall also be available for printing and publishing the results thereof and for administrative planning and direction. The institutes are hereby authorized and encouraged to plan and conduct programs financed under this Act in cooperation with each other and with such other agencies and individuals as may contribute to the solution of the water problems involved, and moneys appropriated pursuant to this Act shall be available for paying the necessary expenses of planning, coordinating, and conducting such cooperative research.

SEC. 104. The Secretary of the Interior is hereby charged with the responsibility for the proper administration of this Act and, after full consultation with other interested Federal agencies, shall prescribe such rules and regulations as may be necessary to carry out its provisions. He shall require a showing that institutes designated to receive funds have, or may reasonably be expected to have, the capability of doing effective work. He shall furnish such advice and assistance as will best promote the purposes of this Act, participate in coordinating research initiated under this Act by the institutes, indicate to them such lines of inquiry as to him seem most important, and encourage and assist in the establishment and maintenance of cooperation by and between the institutes and between them and other research organizations, the United States Department of the Interior, and other Federal establishments.

On or before the 1st day of July in each year after the passage of this Act, the Secretary shall ascertain whether the requirements of section 102 have been met as to each State, whether it is entitled to receive its share of the annual appropriations for water resources research under section 100 of this Act, and the amount which it is entitled to receive.

The Secretary shall make an annual report to the Congress of the receipts and expenditures and work of the institutes in all States under the provisions of this Act. His report shall indicate whether any portion

of an appropriation available for allotment to any State has been withheld and, if so, the reasons therefor.

SEC. 105. Nothing in this Act shall be construed to impair or modify the legal relation existing between any of the colleges or universities under whose direction an institute is established and the government of the State in which it is located, and nothing in this Act shall in any way be construed to authorize Federal control or direction of education at any college or university.

TITLE II—ADDITIONAL WATER RESOURCES RESEARCH PROGRAMS

SEC. 200. There is authorized to be appropriated to the Secretary of the Interior \$1,000,000 in fiscal year 1965 and \$1,000,000 in each of the nine fiscal years thereafter from which he may make grants, contracts, matching, or other arrangements with educational institutions (other than those establishing institutes under title I of this Act), private foundations or other institutions with private firms and individuals; and with local, State and Federal Government agencies, to undertake research into any aspects of water problems related to the mission of the Department of the Interior, which may be deemed desirable and are not otherwise being studied. The Secretary shall submit each such proposed grant, contract, or other arrangement to the President (if the Senate and the Speaker of the House of Representatives, and no appropriation shall be made to finance the same until 60 calendar days (which 60 days, however, shall not include days on which either the House of Representatives or the Senate is not in session because of an adjournment of more than three calendar days) after such submission and then only if, within said 60 days, neither the Committee on Interior and Insular Affairs of the House of Representatives nor the Committee on Interior and Insular Affairs of the Senate disapproves the same.

TITLE III—MISCELLANEOUS PROVISIONS

SEC. 300. The Secretary of the Interior shall obtain the continuing advice and cooperation of all agencies of the Federal Government concerned with water problems, of State and local governments, and of private institutions and individuals, to assure that the programs authorized in this Act will supplement and not duplicate established water research programs, to stimulate research in otherwise neglected areas, and to contribute to a comprehensive, nationwide program of water and related resources research. He shall make generally available information and reports on projects completed, in progress, or planned under the provisions of this Act, in addition to any direct publication of information by the institutes themselves.

SEC. 301. Nothing in this Act is intended to give or shall be construed as giving the Secretary of the Interior any authority or surveillance over water resources research conducted by any other agency of the Federal Government, or as repealing, superseding, or diminishing existing authorities or responsibilities of any agency of the Federal Government to plan and conduct, contract for, or assist in research in its areas of responsibility and concern with water resources.

SEC. 302. Contracts or other arrangements for water resources work authorized under this Act with an institute, educational institution, or non-profit organization may be undertaken without regard to the pro-

visions of section 3684 of the Revised Statutes (31 U.S.C. 529) when, in the judgment of the Secretary of the Interior, advance payments of initial expense are necessary to facilitate such work.

SEC. 303. No part of any appropriated funds may be expended pursuant to authorization given by this Act for any scientific or technological research or development activity unless such expenditure is conditioned upon provisions determined by the Secretary of the Interior, with the approval of the Attorney General, to be effective to insure that all information, uses, products, processes, patents, and other developments resulting from that activity will (with such exceptions and limitations as the Secretary may determine, after consultation with the Secretary of Defense, to be necessary in the interest of the national defense) be made freely and fully available to the general public. Nothing contained in this subsection shall deprive the owner of any background patent relating to any such activity of any rights which that owner may have under that patent.

SEC. 304. There shall be established, in such agency and location as the President determines to be desirable, a center for cataloging current and projected scientific research in all fields of water resources. Each Federal agency doing water resources research shall cooperate by providing the cataloging center with information on work underway or scheduled by it. The cataloging center shall classify and maintain for general use a catalog of water resources research and investigation projects in progress or scheduled by all Federal agencies and by such non-Federal agencies of government, colleges, universities, private institutions, firms, and individuals as voluntarily may make such information available.

SEC. 305. The President shall, by such means as he deems appropriate, clarify agency responsibilities for Federal water resources research and provide for interagency coordination of such research, including the research authorized by this Act. Such coordination shall include (a) continuing review of the adequacy of the Government-wide program in water resources research, (b) identification and elimination of duplication and overlaps between two or more agency programs, (c) identification of technical needs in various water resources research categories, (d) recommendations with respect to allocation of technical effort among the Federal agencies, (e) review of technical manpower needs and findings concerning the technical manpower base of the program, (f) recommendations concerning management policies to improve the quality of the Government-wide research effort, and (g) actions to facilitate interagency communication at management levels.

SEC. 306. As used in this Act, the term "State" includes the Commonwealth of Puerto Rico.

And the House agree to the same.

That the Senate recede from its disagreement to the amendment of the House to the title of the bill, and agree to the same with an amendment as follows:

Amend the title so as to read: "An Act to establish water resources research centers, to promote a more adequate national program of water research, and for other purposes."

WAYNE N. ASPINALL,
WALTER ROGERS,
JAMES A. HALEY,
JOHN P. SAYLOR,
LAURENCE J. BURTON,
Managers on the Part of the House.
HENRY M. JACKSON,
CLINTON P. ANDERSON,
ALAN BIBLE,
THOMAS H. KUCHEL,
LEN B. JORDAN,
Managers on the Part of the Senate.

STATEMENT OF MANAGERS ON THE PART OF THE HOUSE

The managers on the part of the House at the conference on the disagreeing votes of the two Houses on the amendment of the House to the bill (S. 2) to establish water resources research centers at land-grant colleges and State universities, to stimulate water research at other colleges, universities, and centers of competence, and to promote a more adequate national program of water research, submit the following statement in explanation of the effect of the language agreed upon and recommended in the accompanying conference report. The language agreed upon is the language of the House amendment except as herein noted.

Life of program under title I—State water resources research institutes

The Senate-passed bill would authorize a permanent program of grants to establish water resources research institutes in each State and help finance research projects at such institutes. The House amendment limited the program to 10 years. The conference committee agreed to authorizing a permanent program with the understanding that the program will be reviewed periodically by the legislative committees to determine whether it is providing the water research expected, whether satisfactory results are being obtained, and whether modifications in the program are needed. The annual report of the Secretary of the Interior should be prepared with the objective of keeping the Congress fully informed with respect to this research program.

Designation of institutions to receive grants

The Senate-passed bill would permit the designation of a land-grant college and one or more other institutions in each State to receive grants for the establishment of research institutes. The House amendment provides for establishing a water resources research institute at only one college or university in each State, with such institute to be established at the land-grant college unless otherwise provided by an act of the State legislature. The conference committee agreed that there should be not more than one water resources research institute in each State in order to prevent fragmentation of the funds available to conduct research work. The language agreed upon, differing somewhat with the House language, provides for the establishment of the institute at the land-grant college or some other institution designated by act of the State legislature. Where there are two land-grant colleges in one State the Governor, in the absence of a designation by the State legislature, may make the designation as between the two.

Additional water resources research programs

The Senate-passed bill included, under title II, additional water resources research programs involving the appropriation of \$5 million in the first year increasing to \$10 million in the sixth year and thereafter. These funds would be appropriated to the Secretary to make

grants, contracts, matching or other arrangements with educational institutions, private foundations, or other institutions; with private firms and individuals; and with local, State, or Federal Government agencies, to undertake research into any aspects of water problems related to the mission of the Department of the Interior. The House amendment deletes this title entirely. The conference committee agreed to retain the additional water resources research programs in title II of the Senate-passed bill but to limit the amount authorized to be appropriated to \$1 million a year for a period of 10 years, with the further provision that any proposed grant, contract, or other arrangement financed under this title must be submitted to the Congress for the consideration of the Committee on Interior and Insular Affairs of both the Senate and the House of Representatives and funds will not be appropriated for implementation thereof until 60 calendar days after such submission, and then only if, within said period, neither committee disapproves.

Patent provisions

Section 203 of the Senate-passed bill, relating primarily to patents, provides that no part of the funds made available under the act may be expended for research work unless the expenditure is conditioned upon provisions which insure that all information, uses, products, processes, patents, etc., will be made fully and freely available to the general public. The House amendment deletes the language of this section and adds in lieu thereof language requiring the Secretary of the Interior to adhere to the statement of Government patent policy which was promulgated by President Kennedy in his memorandum of October 10, 1963. The conference committee agreed to retain the Senate language.

In all other respects the conference committee agreed to language of the House amendment to the Senate-passed bill.

WAYNE N. ASPINALL,
WALTER ROGERS,
JAMES A. HALEY,
JOHN P. SAYLOR,
LAURENCE J. BURTON,
Managers on the Part of the House.



WATER RESOURCES RESEARCH CENTERS

Mr. O'BRIEN of New York (on behalf of Mr. ASPINALL) submitted the following conference report and statement on the bill (S. 2) to establish water resources research centers at land-grant colleges and State universities, to stimulate water research at other colleges, universities, and centers of competence, and to promote a more adequate national program of water research:

CONFERENCE REPORT (H. REPT. No. 1526)

The committee of conference on the disagreeing votes of the two Houses on the amendments of the House to the bill (S. 2) to establish water resources research centers at land-grant colleges and State universities, to stimulate water research at other colleges, universities, and centers of competence, and to promote a more adequate national program of water research, having met, after full and free conference, have agreed to recommend and do recommend to their respective Houses as follows:

That the Senate recede from its disagreement to the amendment of the House to the text of the bill, and agree to the same with an amendment as follows: In lieu of the matter inserted by the House amendment insert the following:

"That (a) this Act may be cited as the 'Water Resources Research Act of 1964.'

"(b) In order to assist in assuring the Nation at all times of a supply of water sufficient in quantity and quality to meet the requirements of its expanding population, it is the purpose of the Congress, by this Act, to stimulate, sponsor, provide for, and supplement present programs for the conduct of research, investigations, experiments, and the training of scientists in the field of water and of resources which affect water.

"TITLE I—STATE WATER RESOURCES RESEARCH INSTITUTES

"SEC. 100. (a) There are authorized to be appropriated to the Secretary of the Interior for the fiscal year 1965 and each subsequent year thereafter sums adequate to provide \$75,000 to each of the several States in the first year, \$87,500 in each of the second and third years, and \$100,000 each year thereafter to assist each participating State in establishing and carrying on the work of a competent and qualified water resources research institute, center, or equivalent agency (hereinafter referred to as 'institute') at one college or university in that State, which college or university shall be a college or university established in accordance with the Act approved July 2, 1862 (12 Stat. 503), entitled 'An Act donating public lands to the several States and territories which may provide colleges for the benefit of agriculture and the mechanic arts' or some other institution designated by Act of the legislature of the State concerned: *Provided*, That (1) if there is more than one such college or university in a State, established in accordance with said Act of July 2, 1862, funds under this Act shall, in the absence of a designation to the contrary by act of the legislature of the State, be paid to the one such college or university designated by the Governor of the State to receive the same subject to the Secretary's determination that such college or university has, or may reasonably be expected to have, the capability of doing effective work under this Act; (2) two or more States may cooperate in the designation of a single interstate or regional institute, in which event the sums assignable to all of the cooperating States shall be paid to such institute; and (3) a designated college or university may, as authorized by appropriate State authority, arrange with other colleges and universities within the State to participate in the work of the institute.

"(b) It shall be the duty of each such institute to plan and conduct and/or arrange for a component or components of the college or university with which it is affiliated to conduct competent research, investigations, and experiments of either a basic or practical nature, or both, in relation to water resources and to provide for the training of scientists through such research, investigations, and experiments. Such research, investigations, experiments, and training may include, without being limited to, aspects of the hydrologic cycle; supply and demand for water; conservation and best use of available supplies of water; methods of increasing such supplies; and economic, legal, social, engineering, recreational, biological, geographic, ecological, and other aspects of water problems, having due regard to the varying conditions and needs of the respective States, to water research projects being conducted by agencies of the Federal and State Governments, the agricultural experiment stations, and others, and to avoidance of any undue displacement of scientists and engineers elsewhere engaged in water resources research.

"SEC. 101. (a) There is further authorized to be appropriated to the Secretary of the Interior for the fiscal year 1965 and each subsequent year thereafter sums not in excess of the following: 1965, \$1,000,000; 1966, \$2,000,000; 1967, \$3,000,000; 1968, \$4,000,000; and 1969 and each of the succeeding years, \$5,000,000. Such moneys when appropriated, shall be available to match, on a dollar-for-dollar basis, funds made available to institutes by States or other non-Federal sources to meet the necessary expenses of specific water resources research projects which could not otherwise be undertaken, including the expenses of planning and coordinating regional water resources research projects by two or more institutes.

"(b) Each application for a grant pursuant to subsection (a) of this section shall, among other things, state the nature of the project to be undertaken, the period during which it will be pursued, the qualifications of the personnel who will direct and conduct it, the importance of the project to the water economy of the Nation, the region, and the State concerned, its relation to other known research projects theretofore pursued or currently being pursued, and the extent to which it will provide opportunity for the training of water resources scientists. No grant shall be made under said subsection (a) except for a project approved by the Secretary, and all grants shall be made upon the basis of the knowledge which it is expected to produce when completed, and the opportunity it provides for the training of water resources scientists.

"SEC. 102. Sums available to the States under the terms of sections 100 and 101 of this Act shall be paid to their designated institutes at such times and in such amounts during each fiscal year as determined by the Secretary, and upon vouchers approved by him. Each institute shall have an officer appointed by its governing authority who shall receive and account for all funds paid under the provisions of this Act and shall make an annual report to the Secretary on or before the 1st day of September of each year, on work accomplished and the status of projects underway, together with a detailed statement of the amounts received under any of the provisions of this Act during the preceding fiscal year, and of its disbursement, on schedules prescribed by the Secretary. If any of the moneys received by the authorized receiving officer of any institute under the provisions of this Act shall by any action or contingency be found by the Secretary to have been improperly diminished, lost, or misapplied, it shall be replaced by the State concerned and until so replaced no subsequent appropriation shall be allotted or paid to any institute of such State.

"SEC. 103. Moneys appropriated pursuant to this Act, in addition to being available for expenses for research, investigations, experiments, and training conducted under authority of this Act, shall also be available for printing and publishing the results thereof and for administrative planning and direction. The institutes are hereby authorized and encouraged to plan and conduct programs financed under this Act in cooperation with each other and with such other agencies and individuals as may contribute to the solution of the water problems involved, and moneys appropriated pursuant to this Act shall be available for paying the necessary expenses of planning, coordinating, and conducting such cooperative research.

"SEC. 104. The Secretary of the Interior is hereby charged with the responsibility for the proper administration of this Act, and, after full consultation with other interested Federal agencies, shall prescribe such rules and regulations as may be necessary to carry out its provisions. He shall require a showing that institutes designated to receive funds have, or may reasonably be expected to have, the capability of doing effective work. He shall furnish such advice and assistance as will best promote the purposes of this Act, participate in coordinating research initiated under this Act by the institutes, indicate to them such lines of inquiry as to him seem most important, and encourage and assist in the establishment and maintenance of cooperation by and between the institutes and between them and other research organizations, the United States Department of the Interior, and other Federal establishments.

"On or before the 1st day of July in each year after the passage of this Act, the Secretary shall ascertain whether the requirements of section 102 have been met as to each State, whether it is entitled to receive its share of the annual appropriations for water resources research under section 100 of this Act, and the amount which it is entitled to receive.

"The Secretary shall make an annual report to the Congress of the receipts and expenditures and work of the institutes in all States under the provisions of this Act. His report shall indicate whether any portion of an appropriation available for allotment to any State has been withheld and, if so, the reasons therefor.

"SEC. 105. Nothing in this Act shall be construed to impair or modify the legal relation existing between any of the colleges or universities under whose direction an institute is established and the government of the State in which it is located, and nothing in this Act shall in any way be construed to authorize Federal control or direction of education at any college or university.

"TITLE II—ADDITIONAL WATER RESOURCES RESEARCH PROGRAMS

"SEC. 200. There is authorized to be appropriated to the Secretary of the Interior \$1,000,000 in fiscal year 1965 and \$1,000,000 in each of the nine fiscal years thereafter from which he may make grants, contracts, matching, or other arrangements with educational institutions (other than those establishing institutes under Title I of this Act), private foundations or other institutions; with private firms and individuals; and with local, State and Federal Government agencies, to undertake research into any aspects of water problems related to the mission of the Department of the Interior, which may be deemed desirable and are not otherwise being studied. The Secretary shall submit each such proposed grant, contract, or other arrangement to the President of the Senate and the Speaker of the House of Representatives, and no appropriation shall be made to finance the same until 60 calendar days (which 60 days, however, shall not include days on which

either the House of Representatives or the Senate is not in session because of an adjournment of more than three calendar days) after such submission and then only if, within said 60 days, neither the Committee on Interior and Insular Affairs of the House of Representatives nor the Committee on Interior and Insular Affairs of the Senate disapproves the same.

"TITLE III—MISCELLANEOUS PROVISIONS

"SEC. 300. The Secretary of the Interior shall obtain the continuing advice and co-operation of all agencies of the Federal Government concerned with water problems, of State and local governments, and of private institutions and individuals, to assure that the programs authorized in this Act will supplement and not duplicate established water research programs, to stimulate research in otherwise neglected areas, and to contribute to a comprehensive, nationwide program of water and related resources research. He shall make generally available information and reports on projects completed, in progress, or planned under the provisions of this Act, in addition to any direct publication of information by the institutes themselves.

"SEC. 301. Nothing in this Act is intended to give or shall be construed as giving the Secretary of the Interior any authority or surveillance over water resources research conducted by any other agency of the Federal Government, or as repealing, superseding, or diminishing existing authorities or responsibilities of any agency of the Federal Government to plan and conduct, contract for, or assist in research in its areas of responsibility and concern with water resources.

"SEC. 302. Contracts or other arrangements for water resources work authorized under this Act with an institute, educational institution, or non-profit organization may be undertaken without regard to the provisions of section 3684 of the Revised Statutes (31 U.S.C. 529) when, in the judgment of the Secretary of the Interior, advance payments of initial expense are necessary to facilitate such work.

"SEC. 303. No part of any appropriated funds may be expended pursuant to authorization given by this Act for any scientific or technological research or development activity unless such expenditure is conditioned upon provisions determined by the Secretary of the Interior, with the approval of the Attorney General, to be effective to insure that all information, uses, products, processes, patents, and other developments resulting from that activity will (with such exceptions and limitations as the Secretary may determine, after consultation with the Secretary of Defense, to be necessary in the interest of the national defense) be made freely and fully available to the general public. Nothing contained in this subsection shall deprive the owner of any background patent relating to any such activity of any rights which that owner may have under that patent.

"SEC. 304. There shall be established, in such agency and location as the President determines to be desirable, a center for cataloging current and projected scientific research in all fields of water resources. Each Federal agency doing water resources research shall cooperate by providing the cataloging center with information on work underway or scheduled by it. The cataloging center shall classify and maintain for general use a catalog of water resources research and investigation projects in progress or scheduled by all Federal agencies and by such non-Federal agencies of government, colleges, universities, private institutions, firms, and individuals as voluntarily may make such information available.

"SEC. 305. The President shall, by such means as he deems appropriate, clarify

agency responsibilities for Federal water resources research and provide for interagency coordination of such research, including the research authorized by this Act. Such coordination shall include (a) continuing review of the adequacy of the Government-wide program in water resources research, (b) identification and elimination of duplication and overlaps between two or more agency programs, (c) identification of technical needs in various water resources research categories, (d) recommendations with respect to allocation of technical effort among the Federal agencies, (e) review of technical manpower needs and findings concerning the technical manpower base of the program, (f) recommendations concerning management policies to improve the quality of the Government-wide research effort, and (g) actions to facilitate interagency communication at management levels.

"SEC. 306. As used in this Act, the term 'State', includes the Commonwealth of Puerto Rico."

And the House agree to the same.

That the Senate recede from its disagreement to the amendment of the House to the title of the bill, and agree to the same with an amendment as follows: Amend the title so as to read: "An Act to establish water resources research centers, to promote a more adequate national program of water research, and for other purposes."

WAYNE N. ASPINALL,

WALTER ROGERS,

JAMES A. HALEY,

JOHN P. SAYLOR,

LAURENCE J. BURTON,

Manager on the Part of the House.

HENRY M. JACKSON,

CLINTON P. ANDERSON,

ALAN BIBLE,

THOMAS H. KUCHEL,

LEN B. JORDAN,

Managers on the Part of the Senate.

STATEMENT

The managers on the part of the House at the conference on the disagreeing votes of the two Houses on the amendment of the House to the bill (S. 2) to establish water resources research centers at land grant colleges and State universities, to stimulate water research at other colleges, universities, and centers of competence, and to promote a more adequate national program of water research, submit the following statement in explanation of the effect of the language agreed upon and recommended in the accompanying conference report. The language agreed upon is the language of the House amendment except as herein noted.

LIFE OF PROGRAM UNDER TITLE I—STATE WATER RESOURCES RESEARCH INSTITUTES

The Senate-passed bill would authorize a permanent program of grants to establish water resources research institutes in each State and help finance research projects at such institutes. The House amendment limited the program to 10 years. The conference committee agreed to authorizing a permanent program with the understanding that the program will be reviewed periodically by the legislative committees to determine whether it is providing the water research expected, whether satisfactory results are being obtained, and whether modifications in the program are needed. The annual report of the Secretary of the Interior should be prepared with the objective of keeping the Congress fully informed with respect to this research program.

DESIGNATION OF INSTITUTIONS TO RECEIVE GRANTS

The Senate-passed bill would permit the designation of a land grant college and one or more other institutions in each State to receive grants for the establishment of research institutes. The House amendment provides for establishing a water resources

research institute at only one college or university in each State, with such institute to be established at the land grant college unless otherwise provided by an act of the State legislature. The conference committee agreed that there should be not more than one water resources research institute in each State in order to prevent fragmentation of the funds available to conduct research work. The language agreed upon, differing somewhat with the House language, provides for the establishment of the institute at the land grant college or some other institution designated by act of the State legislature. Where there are two land grant colleges in one State the Governor, in the absence of a designation by the State legislature, may make the designation as between the two.

ADDITIONAL WATER RESOURCES RESEARCH PROGRAMS

The Senate-passed bill included, under title II, additional water resources research programs involving the appropriation of \$5 million in the first year increasing to \$10 million in the 6th year and thereafter. These funds would be appropriated to the Secretary to make grants, contracts, matching or other arrangements with educational institutions, private foundations, or other institutions; with private firms and individuals; and with local, State, or Federal government agencies, to undertake research into any aspects of water problems related to the mission of the Department of the Interior. The House amendment deletes this title entirely. The conference committee agreed to retain the additional water resources research programs in title II of the Senate-passed bill but to limit the amount authorized to be appropriated to \$1 million a year for a period of 10 years, with the further provision that any proposed grant, contract or other arrangement financed under this title must be submitted to the Congress for the consideration of the Committee on Interior and Insular Affairs of both the Senate and the House of Representatives and funds will not be appropriated for implementation thereof until 60 calendar days after such submission, and then only if, within said period, neither committee disapproves.

PATENT PROVISIONS

Section 203 of the Senate-passed bill, relating primarily to patents, provides that no part of the funds made available under the act may be expended for research work unless the expenditure is conditioned upon provisions which insure that all information, uses, products, processes, patents, etc. will be made fully and freely available to the general public. The House amendment deletes the language of this section and adds in lieu thereof language requiring the Secretary of the Interior to adhere to the Statement of Government Patent Policy which was promulgated by President Kennedy in his memorandum of October 10, 1963. The conference committee agreed to retain the Senate language.

In all other respects the conference committee agreed to language of the House amendment to the Senate-passed bill.

WAYNE N. ASPINALL,

WALTER ROGERS,

JAMES A. HALEY,

JOHN P. SAYLOR,

LAURENCE J. BURTON,

Managers on the Part of the House.

AGITATORS HIT BY GRAHAM

(Mr. WINSTEAD asked and was given permission to address the House for 1 minute and to revise and extend his remarks and to include extraneous matter.)

Mr. WINSTEAD. Mr. Speaker, I would like to call the attention of the

Digest of CONGRESSIONAL PROCEEDINGS

OF INTEREST TO THE DEPARTMENT OF AGRICULTURE

UNITED STATES DEPARTMENT OF AGRICULTURE

Washington, D. C. 20250

Official business

Postage and fees paid

U. S. Department of Agriculture

OFFICE OF
BUDGET AND FINANCE

(For information only;
should not be quoted
or cited)

Issued July 6, 1964
For actions of July 2, 1964
88th-2d, No. 133

HIGHLIGHTS: See page 5

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SENATE

1. PERSONNEL. Passed, 58-21, with amendments H. R. 11049, the Federal pay bill. Agreed to amendments not affecting this Department. Rejected numerous amendments. Senate conferees were appointed. pp. 15275-325
Sen. Byrd inserted the report of the Joint Committee on Reduction of Nonessential Federal Expenditures, "Federal Personnel in Executive Branch, May 1964 and April 1964, and Pay, April 1964 and March 1964." pp. 15246-50
Sen. Miller indicated a belief that improper tactics had been used in getting Federal employees to attend the \$100 Democratic fundraising event, and inserted articles by Joseph Young on this subject. pp. 15255-6
2. MEAT IMPORTS. The Finance Committee reported with amendments H. R. 1839, to amend the Tariff Act, including restrictions on meat imports (S. Rept. 1167). p. 15246
3. ROADS; FORESTRY. Passed as reported H. R. 10503, to authorize 1966-1967 appropriations for roads, including forest development roads and trails. pp. 15331-3

4. WATER RESEARCH. Both Houses agreed to the conference report on S. 2, to authorize Federal aid for water-resources research. See Digest 109 for provisions. This bill will now be sent to the President. pp. 15326-8, D544, 15373-5
5. FOREIGN AID. The Foreign Relations Committee voted to report (but did not actually report), 12 to 2, with amendments H. R. 11380, the foreign-aid authorization bill. The committee announced that a report would be filed Sat., July 11. The Record contains a table setting forth amounts provided for at various legislative stages. pp. D545-6
Both Houses received from the Treasury Department a proposed bill to amend the Inter-American Development Bank Act to authorize the U. S. to participate in an increase in the resources of the Fund for Special Operations of the Inter-American Development Bank; to Senate Foreign Relations Committee and House Banking and Currency Committee. pp. 15246, 15447
6. PACKAGING. Sen. Keating inserted a Long Island Women's Clubs resolution favoring the truth-in-packaging bill. p. 15246
7. AREA REDEVELOPMENT. Sen. Miller claimed information submitted to Congress by the Area Redevelopment Administration was inaccurate and inserted a report from the Comptroller General on this matter. pp. 15254-5
8. EXPENDITURES. Sen. Robertson inserted a report from the U. S. Chamber of Commerce recommending an "economy program for the fiscal year 1965" including proposed cuts in USDA programs. pp. 15258-61
9. TRAVEL. Passed as reported H. J. Res. 658, requesting the President to proclaim 1964 as "See America Year." p. 15263
10. RADIATION. Passed without amendment H. R. 10437, to incorporate the National Committee on Radiation Protection and Measurements. This bill will now be sent to the President. p. 15264
11. RECLAMATION; RECREATION. Sen. Gruening inserted and discussed a report, "New Fishing Areas Opened at Bureau of Reclamation Reservoirs in West; Recreation Uses Show Large Increase." pp. 15264-7
12. GRAIN EXPORTS. Sen. Dodd questioned the Commerce Department approval for Soviet resale of American grain to Rumania. p. 15274
13. CIVIL RIGHTS. Sen. Humphrey inserted a summary of the new civil rights law. pp. 15333-4
14. ELECTRIFICATION. Sen. Morse spoke in favor of a Pacific Northwest-Southwest intertie, but questioned the Interior Department recommendations on this subject. p. 15335
15. HOUSING LOANS. The Housing Subcommittee of the Banking and Currency Committee voted favorably on an original bill embodying proposed housing amendments for 1964. p. D545
16. LEGISLATIVE PROGRAM. Sen. Mansfield said the Senate will be in session July 6-10 and that "we expect appropriation and other bills of worthwhile significance to come up" involving "the possibility of quorum calls and votes." p. 15306

representatives, to tack on very large salary increases for hundreds of presidential appointees, members of the judiciary, and Members of Congress—apparently with the idea that such increases could not stand on their own merits in a separate bill. If, indeed, they are justifiable, why were they not placed in a separate bill? But they were not.

It would not have been so bad if these increases for others in the high-income brackets had not been so great. I believe that a \$10,000 a year increase for the members of the Cabinet is excessive. I believe that a \$7,500 a year increase for Members of Congress is somewhat excessive, particularly in the face of rejection by a majority of the Members of the Senate of the amendment, offered by the Senator from Delaware [Mr. WILLIAMS], which would have prevented the Executive appointee and legislative increases from going into effect until after completion of a year in which we had a balanced budget. The adoption of such an amendment would have had a salutary influence on members of the executive branch and Members of Congress toward keeping faith with the purchasing power of the peoples' hard-earned money, which is steadily being eroded by the inflation which multibillion dollar deficit spending is causing.

I believe that a majority of the taxpayers would have supported a modest increase in salary for these presidential appointees, judges, and Members of Congress. Such an increase runs to the office—not to the individuals who occupy the office today, and may be gone tomorrow. My amendment to provide for increases of \$5,000 for these various positions was rejected by a majority of my colleagues. Such being the case, they must bear the responsibility for the passage of this bill.

The PRESIDING OFFICER. All time on the bill has now been yielded back. The bill having been read the third time, the question is, Shall it pass? On this question the yeas and nays have been ordered; and the clerk will call the roll.

The legislative clerk proceeded to call the roll.

Mr. FULBRIGHT (when his name was called). On this vote I have a pair with the Senator from Louisiana [Mr. ELLENDER]. If he were present and voting, he would vote "nay." If I were at liberty to vote, I would vote "yea." I withhold my vote.

Mr. JORDAN of Idaho (when his name was called). On this vote I have a pair with the Senator from Hawaii [Mr. FONG]. If he were present and voting, he would vote "yea"; if I were at liberty to vote, I would vote "nay." I withhold my vote.

Mr. WALTERS (when his name was called). Mr. President, on this vote I have a pair with the Senator from Colorado [Mr. DOMINICK]. If he were present and voting, he would vote "nay"; if I were at liberty to vote, I would vote "yea." I withhold my vote.

Mr. WILLIAMS of Delaware (when his name was called). Mr. President, on this vote I have a pair with the Senator from Kansas [Mr. CARLSON]. If he were

present and voting, he would vote "yea." If I were at liberty to vote, I would vote "nay." I withhold my vote.

The rollcall was concluded.

Mr. CHURCH (after having voted in the negative). Mr. President, on this vote I have a pair with the Senator from Texas [Mr. YARBOROUGH]. If he were present and voting, he would vote "yea." If I were at liberty to vote, I would vote "nay." I withdraw my vote.

Mr. MANSFIELD (after having voted in the affirmative). Mr. President, on this vote I have a pair with the Senator from Nebraska [Mr. HRUSKA]. If he were present and voting, he would vote "nay"; if I were at liberty to vote, I would vote "yea." I withdraw my vote.

Mr. PEARSON (after having voted in the negative). Mr. President, on this vote I have a pair with the Senator from Massachusetts [Mr. KENNEDY]. If he were present and voting, he would vote "yea"; if I were at liberty to vote, I would vote "nay." I withdraw my vote.

Mr. HUMPHREY. I announce that the Senator from Louisiana [Mr. ELLENDER], the Senator from Michigan [Mr. HART], and the Senator from Georgia [Mr. TALMADGE] are absent on official business.

I also announce that the Senator from California [Mr. ENGLE], the Senator from Indiana [Mr. BAYH], and the Senator from Massachusetts [Mr. KENNEDY] are absent because of illness.

I further announce that the Senator from Texas [Mr. YARBOROUGH] and the Senator from Florida [Mr. SMATHERS] are necessarily absent.

I further announce that, if present and voting, the Senator from Florida [Mr. SMATHERS] would vote "yea."

Mr. KUCHEL. I announce that the Senator from New Hampshire [Mr. CORTON], the Senator from Hawaii [Mr. FONG], the Senator from Nebraska [Mr. HRUSKA], and the Senator from Massachusetts [Mr. SALTONSTALL] are necessarily absent.

The Senator from Colorado [Mr. DOMINICK] and the Senator from Kansas [Mr. CARLSON] are detained on official business.

On this vote, the Senator from Massachusetts [Mr. SALTONSTALL] is paired with the Senator from New Hampshire [Mr. CORTON]. If present and voting, the Senator from Massachusetts would vote "yea" and the Senator from New Hampshire would vote "nay."

The respective pairs of the Senator from Hawaii [Mr. FONG], the Senator from Kansas [Mr. CARLSON], the Senator from Colorado [Mr. DOMINICK], and that of the Senator from Nebraska [Mr. HRUSKA] have been previously announced.

The result was announced—yeas 58, nays 21, as follows:

[No. 468 Leg.]

YEAS—58

Aiken	Burdick	Edmondson
Allott	Byrd, W. Va.	Ervin
Anderson	Cannon	Goldwater
Bartlett	Case	Gruening
Beall	Clark	Hartke
Bible	Dirksen	Hayden
Boggs	Dodd	Hill
Brewster	Douglas	Humphrey

Inouye
Jackson
Javits
Johnston
Jordan, N.C.
Keating
Kuchel
Long, Mo.
Long, La.
Magnuson
McCarthy
McGee

McIntyre
McNamara
Metcalf
Monroney
Morse
Morton
Moss
Muskie
Nelson
Neuberger
Pastore
Pell

Prouty
Proxmire
Randolph
Ribicoff
Scott
Smith
Sparkman
Symington
Williams, N.J.
Young, N. Dak.

NAYS—21

Bennett
Byrd, Va.
Cooper
Curtis
Eastland
Gore
Hickenlooper

Holland
Lausche
McClellan
McGovern
Mecham
Miller
Mundt

Robertson
Russell
Simpson
Stennis
Thurmond
Tower
Young, Ohio

NOT VOTING—21

Bayh
Carlson
Church
Cotton
Dominick
Ellender
Engle

Fong
Fulbright
Hart
Hruska
Jordan, Idaho
Kennedy
Mansfield

Pearson
Saltonstall
Smathers
Talmadge
Walters
Williams, Del.
Yarborough

So the bill (H.R. 11049) was passed.

Mr. MANSFIELD. Mr. President, I move to reconsider the vote by which the bill was passed.

Mr. JOHNSTON. Mr. President, I move to lay that motion on the table.

The motion to lay on the table was agreed to.

Mr. JOHNSTON. Mr. President, I move that the Senate insist on its amendment to H.R. 11049, and ask for a conference with the House, and that the Chair be authorized to appoint the conferees on the part of the Senate.

The PRESIDING OFFICER. Without objection, it is so ordered. The Chair appoints the following conferees: Mr. JOHNSTON, Mr. MONRONEY, and Mr. CARLSON.

Mr. LAUSCHE, Mr. President, I do not have to run for election, if ever, until the year 1968. I have had no inhibition with respect to the votes which I have cast. They have been motivated solely for the purpose of serving the people of the country.

In my opinion, what has happened on the floor of the Senate today and yesterday is inimical to the security of the country.

Under the bill which has been passed, I shall be entitled to a raise in my salary of \$7,500. If other Senators are entitled to it, I believe that I am.

I am conscientiously of the opinion that I have tried to preserve the security of my country. I have subordinated my interest in every instance where I thought that subordination was necessary.

I now announce that although others have done far more harm to my country than I have—and on that basis I am far more entitled to the \$7,500 pay increase—I will not accept it. I will inform the paying officer that, in my judgment, what has been done is erroneous. It is not in the interest of the country. It is a theft upon savings of annuitants and pensioners. And therefore, I will not take this increased payment.

MESSAGE FROM THE HOUSE

A message from the House of Representatives, by Mr. Bartlett, one of its

reading clerks, informed the Senate that, pursuant to the provisions of House Concurrent Resolution 179, 88th Congress, the Speaker had appointed Mr. FALLON, of Maryland, and Mr. CRAMER, of Florida, as members on the part of the House of the special committee to convey to the members of the American Association of State Highway Officials an expression of appreciation by the Congress of the praiseworthy accomplishments under their leadership.

The message announced that the House had agreed to the report of the committee of conference on the disagreeing votes of the two Houses on the amendments of the House to the bill (S. 2) to establish water resources research centers at land-grant colleges and State universities, to stimulate water research at other colleges, universities, and centers of competence, and to promote a more adequate national program of water research.

The message also announced that the House had agreed to the amendment of the Senate to the bill (H.R. 6455) to amend subsection (b) of section 512 of the Internal Revenue Code of 1954 (dealing with unrelated business taxable income).

The message further announced that the House had agreed to the amendments of the Senate to the bill (H.R. 8590) to incorporate the Aviation Hall of Fame.

The message also announced that the House had agreed to the report of the committee of conference on the disagreeing votes of the two Houses on the amendments of the Senate to the bill (H.R. 10456) to authorize appropriations to the National Aeronautics and Space Administration for research and development, construction of facilities, and administrative operations, and for other purposes.

The message further announced that the House had agreed to the amendment of the Senate to the concurrent resolution (H. Con. Res. 321) establishing that when the House adjourns on Thursday, July 2, 1964, it stand adjourned until 12 o'clock noon on Monday, July 20, 1964.

REQUEST OF PRESIDENT OF THE UNITED STATES TO RETURN TO THE HOUSE OF REPRESENTATIVES ENROLLED BILL (H.R. 10053) TO AMEND SECTION 502 OF THE MERCHANT MARINE ACT OF 1936

Mr. MANSFIELD. Mr. President, I send to the desk a concurrent resolution and ask for its immediate consideration.

The PRESIDING OFFICER. The clerk will state the concurrent resolution.

The legislative clerk read the concurrent resolution (H. Con. Res. 323), as follows:

The President of the United States is requested to return to the House of Representatives the enrolled bill (H.R. 10053) to amend section 502 of the Merchant Marine Act, 1936, relating to construction differential subsidies. If and when said bill is returned by the President, the action of the Presiding Officers of the two Houses in sign-

ing the bill shall be deemed rescinded; and the Clerk of the House is authorized and directed, in the reenrollment of said bill, to make the following correction:

Strike out all after the enacting clause and insert in lieu thereof the following: "That the proviso in the second sentence of subsection (b) of section 502 of the Merchant Marine Act, 1936, as amended (46 U.S.C. 1152(b)), is amended by striking out 'June 30, 1964' and inserting in lieu thereof 'June 30, 1965.'"

The PRESIDING OFFICER. Is there objection to the request of the Senator from Montana?

There being no objection, the concurrent resolution was considered and agreed to.

WATER RESOURCES RESEARCH CENTERS—CONFERENCE REPORT

Mr. ANDERSON. Mr. President, I submit a report of the committee of conference on the disagreeing votes of the two Houses on the amendments of the House to the bill (S. 2) to establish water resources research centers at land-grant colleges and State universities, to stimulate water research at other colleges, universities, and centers of competence, and to promote a more adequate national program of water research. I ask unanimous consent for the present consideration of the report.

The PRESIDING OFFICER. The report will be read for the information of the Senate.

The legislative clerk read the report.

(For conference report, see House proceedings of June 30, 1964, pp. 14997-14998, CONGRESSIONAL RECORD.)

The PRESIDING OFFICER. Is there objection to the present consideration of the report?

There being no objection, the Senate proceeded to consider the report.

Mr. ANDERSON. Mr. President, I ask unanimous consent to have printed in the RECORD a colloquy on the conference report on S. 2.

There being no objection, the colloquy was ordered to be printed in the RECORD, as follows:

COLLOQUY ON S. 2 CONFERENCE REPORT

Question. I have a question or two about the changes in S. 2 as agreed upon in conference. In section 100(b) it is provided that a Water Resources Research Institute may arrange for research by a component or components of the college or university with which it is affiliated.

This language indicates that the institute is intended to be collegewide or university-wide and not attached to a single component, or school, like the engineering school or the agricultural section, of the college or university.

Answer. That is correct. Water involves nearly all disciplines in the field of knowledge and all should be available to a water resources research center. The original Senate bill said the institutes should be collegewide or universitywide. In conference we agreed the words were not necessary since the institute is clearly to be a part of the whole college or university, not a part of a single department within it.

Question. The second part of my question involving this same subsection. The bill encourages the colleges and universities in two or more States to unite in a single center. Elsewhere it encourages the college or university selected for the center or institute to

seek cooperation of other educational institutions in the State. Where two or more schools are working together in a single institute, would it not be proper to allow for research jobs, to be done in a component or components of more than one of the colleges or universities—components of any of the colleges or universities with which the institute is affiliated? The bill uses the singular "college or university" instead of the plural.

Answer. That is correct, and we also discussed that a little in conference. We decided use of the plural is not necessary. In title I of volume 1, section 1 of the United States Code the first sentence, which is instruction on how to read and interpret law, it says: "In determining the meaning of any act of Congress, unless the context indicates otherwise—words importing the singular include and apply to several persons, parties or things." I am sure the singular "college or university" in question can properly be read to mean the plural, as well, under this rule.

Question. The House has deleted, and you have accepted the deletion, of language which would have permitted the use of section 100(a) funds for construction and equipment of structures. Does this mean that none of the research funds would be available to construct a model of a floodgate, or that building a wavemaker to study bank erosion would not be permissible, or that you couldn't buy thermometers to take the temperature of water, or vessels to contain the water, out of such funds?

Answer. It was not intended to prevent doing the necessary construction of models or things necessary to a specific research project. The deletion was aimed at using, the \$75,000 to \$100,000 annual grant to pay installments on a permanent campus building—structures like that. The agricultural experiment program permits supplies, instruments and things necessary to a specific research project to come out of the matching funds—but not permanent buildings or structures that ought to be financed from the university building fund. I do not believe that, following the precedent of the long established agricultural research program under the Hatch Act of 1877—now over 75 years old, there will be any difficulty with the language.

The House committee and the Senate committee want this Federal aid money to buy research—not buildings. All the legitimate expenses of research projects can be met with the matched State and Federal funds. We did unsuccessfully attempt to permit provision for employee retirement contributions out of section 100(a) grants. The House felt that since the employees would be employees of the college or university, it should handle provision for their retirement. While I prefer the authorization in the Senate bill, which parallels agricultural research arrangements, I do not believe this will impede the program. It it does, we can reconsider the matter later.

Question. Section 101(a) of S. 2 provides for matching grants in support of research projects, and it uses the phrase "to match, on a dollar-for-dollar basis". Is this language intended to exclude from the universities' matching, a fair value of the services, facilities, or other contributions a university may make toward carrying on the research?

Answer. Not at all. When a university contributes such costs they are recognized as part of its matching in agricultural research and will be in this program.

Mr. ANDERSON. Mr. President, I move that the Senate agree to the conference report.

The report was agreed to.

Mr. ANDERSON. Mr. President, I ask unanimous consent to have a portion

of the conference report (No. 1526) printed at this point in the RECORD.

There being no objection, the extract was ordered to be printed in the RECORD, as follows: —

The committee of conference on the disagreeing votes of the two Houses on the amendments of the House to the bill (S. 2) to establish water resources research centers at land-grant colleges and State universities, to stimulate water research at other colleges, universities, and centers of competence, and to promote a more adequate national program of water research, having met, after full and free conference, have agreed to recommend and do recommend to their respective Houses as follows:

That the Senate recede from its disagreement to the amendment of the House to the text of the bill, and agree to the same with an amendment as follows:

In lieu of the matter inserted by the House amendment insert the following: "That (a) this Act may be cited as the 'Water Resources Research Act of 1964.'"

"(b) In order to assist in assuring the Nation at all times of a supply of water sufficient in quantity and quality to meet the requirements of its expanding population, it is the purpose of the Congress, by this Act, to stimulate, sponsor, provide for, and supplement present programs for the conduct of research, investigations, experiments, and the training of scientists in the fields of water and of resources which affect water.

"TITLE I—STATE WATER RESOURCES RESEARCH INSTITUTES

"Sec. 100. (a) There are authorized to be appropriated to the Secretary of the Interior for the fiscal year 1965 and each subsequent year thereafter sums adequate to provide \$75,000 to each of the several States in the first year, \$87,500 in each of the second and third years, and \$100,000 each year thereafter to assist each participating State in establishing and carrying on the work of a competent and qualified water resources research institute, center, or equivalent agency (hereinafter referred to as 'institute') at one college or university in that State, which college or university shall be a college or university established in accordance with the Act approved July 2, 1862 (12 Stat. 503), entitled 'An Act donating public lands to the several States and territories which may provide colleges for the benefit of agriculture and the mechanic arts' or some other institution designated by Act of the legislature of the State concerned: *Provided*, That (1) if there is more than one such college or university in a State, established in accordance with said Act of July 2, 1862, funds under this Act shall, in the absence of a designation to the contrary by act of the legislature of the State, be paid to the one such college or university designated by the Governor of the State to receive the same subject to the Secretary's determination that such college or university has, or may reasonably be expected to have, the capability of doing effective work under this Act; (2) two or more States may cooperate in the designation of a single interstate or regional institute, in which event the sums assignable to all of the cooperating States shall be paid to such institute; and (3) a designated college or university may, as authorized by appropriate State authority, arrange with other colleges and universities within the State to participate in the work of the institute.

"(b) It shall be the duty of each such institute to plan and conduct and/or arrange for a component or components of the college or university with which it is affiliated to conduct competent research, investigations, and experiments of either a basic or practical nature, or both, in relation to water resources and to provide for the training of scientists through such research, investigations, and experiments. Such research, in-

vestigations, experiments, and training may include, without being limited to, aspects of the hydrologic cycle; supply and demand for water; conservation and best use of available supplies of water; methods of increasing such supplies; and economic, legal, social, engineering, recreational, biological, geographic, ecological, and other aspects of water problems, having due regard to the varying conditions and needs of the respective States, to water research projects being conducted by agencies of the Federal and State Governments, the agricultural experiment stations, and others, and to avoidance of any undue displacement of scientists and engineers elsewhere engaged in water resources research.

"Sec. 101. (a) There is further authorized to be appropriated to the Secretary of the Interior for the fiscal year 1965 and each subsequent year thereafter sums not in excess of the following: 1965, \$1,000,000; 1966, \$2,000,000; 1967, \$3,000,000; 1968, \$4,000,000; and 1969 and each of the succeeding years, \$5,000,000. Such moneys when appropriated, shall be available to match, on a dollar-for-dollar basis, funds made available to institutes by States or other non-Federal sources to meet the necessary expenses of specific water resources research projects which could not otherwise be undertaken, including the expenses of planning and coordinating regional water resources research projects by two or more institutes.

"(b) Each application for a grant pursuant to subsection (a) of this section shall, among other things, state the nature of the project to be undertaken, the period during which it will be pursued, the qualifications of the personnel who will direct and conduct it, the importance of the project to the water economy of the Nation, the region, and the State concerned, its relation to other known research projects theretofore pursued or currently being pursued, and the extent to which it will provide opportunity for the training of water resources scientists. No grant shall be made under said subsection (a) except for a project approved by the Secretary, and all grants shall be made upon the basis of the merit of the project, the need for the knowledge which it is expected to produce when completed, and the opportunity it provides for the training of water resources scientists.

"Sec. 102. Sums available to the States under the terms of sections 100 and 101 of this Act shall be paid to their designated institutes at such times and in such amounts during each fiscal year as determined by the Secretary, and upon vouchers approved by him. Each institute shall have an officer appointed by its governing authority who shall receive and account for all funds paid under the provisions of this Act and shall make an annual report to the Secretary on or before the 1st day of September of each year, on work accomplished and the status of projects underway, together with a detailed statement of the amounts received under any of the provisions of this Act during the preceding fiscal year, and of its disbursement, on schedules prescribed by the Secretary. If any of the moneys received by the authorized receiving officer of any institute under the provisions of this Act shall by any action or contingency be found by the Secretary to have been improperly diminished, lost, or misapplied, it shall be replaced by the State concerned and until so replaced no subsequent appropriation shall be allotted or paid to any institute of such State.

"Sec. 103. Moneys appropriated pursuant to this Act, in addition to being available for expenses for research, investigations, experiments, and training conducted under authority of this Act, shall also be available for printing and publishing the results thereof and for administrative planning and direction. The institutes are hereby author-

ized and encouraged to plan and conduct programs financed under this Act in cooperation with each other and with such other agencies and individuals as may contribute to the solution of the water problems involved, and moneys appropriated pursuant to this Act shall be available for paying the necessary expenses of planning, coordinating, and conducting such cooperative research.

"Sec. 104. The Secretary of the Interior is hereby charged with the responsibility for the proper administration of this Act and, after full consultation with other interested Federal agencies, shall prescribe such rules and regulations as may be necessary to carry out its provisions. He shall require a showing that institutes designated to receive funds have, or may reasonably be expected to have, the capability of doing effective work. He shall furnish such advice and assistance as will best promote the purposes of this Act, participate in coordinating research initiated under this Act by the institutes, indicate to them such lines of inquiry as to him seem most important, and encourage and assist in the establishment and maintenance of cooperation by and between the institutes and between them and other research organizations, the United States Department of the Interior, and other Federal establishments.

"On or before the 1st day of July in each year after the passage of this Act, the Secretary shall ascertain whether the requirements of section 102 have been met as to each State, whether it is entitled to receive its share of the annual appropriations for water resources research under section 100 of this Act, and the amount which it is entitled to receive.

"The Secretary shall make an annual report to the Congress of the receipts and expenditures and work of the institutes in all States under the provisions of this Act. His report shall indicate whether any portion of an appropriation available for allotment to any State has been withheld and, if so, the reasons therefor.

"Sec. 105. Nothing in this Act shall be construed to impair or modify the legal relation existing between any of the colleges or universities under whose direction an institute is established and the government of the State in which it is located, and nothing in this Act shall in any way be construed to authorize Federal control or direction of education at any college or university.

"TITLE II—ADDITIONAL WATER RESOURCES RESEARCH PROGRAMS

"Sec. 200. There is authorized to be appropriated to the Secretary of the Interior \$1,000,000 in fiscal year 1965 and \$1,000,000 in each of the nine fiscal years thereafter from which he may make grants, contracts, matching, or other arrangements with educational institutions (other than those establishing institutes under title I of this Act), private foundations or other institutions with private firms and individuals; and with local, State and Federal Government agencies, to undertake research into any aspects of water problems related to the mission of the Department of the Interior, which may be deemed desirable and are not otherwise being studied. The Secretary shall submit each such proposed grant, contract, or other arrangement to the President of the Senate and the Speaker of the House of Representatives, and no appropriation shall be made to finance the same until 60 calendar days (which 60 days, however, shall not include days on which either the House of Representatives or the Senate is not in session because of an adjournment of more than three calendar days) after such submission and then only if, within said 60 days, neither the Committee on Interior and Insular Affairs of the House of Representatives nor the Committee on Interior and Insular Affairs of the Senate disapproves the same.

"TITLE III—MISCELLANEOUS PROVISIONS"

"Sec. 300. The Secretary of the Interior shall obtain the continuing advice and cooperation of all agencies of the Federal Government concerned with water problems, of State and local governments, and of private institutions and individuals, to assure that the programs authorized in this Act will supplement and not duplicate established water research programs, to stimulate research in otherwise neglected areas, and to contribute to a comprehensive, nationwide program of water and related resources research. He shall make generally available information and reports on projects completed, in progress, or planned under the provisions of this Act, in addition to any direct publication of information by the institutes themselves.

"Sec. 301. Nothing in this Act is intended to give or shall be construed as giving the Secretary of the Interior any authority or surveillance over water resources research conducted by any other agency of the Federal Government, or as repealing, superseding, or diminishing existing authorities or responsibilities of any agency of the Federal Government to plan and conduct, contract for, or assist in research in its areas of responsibility and concern with water resources.

"Sec. 302. Contracts or other arrangements for water resources work authorized under this Act with an institute, educational institution, or non-profit organization may be undertaken without regard to the provisions of section 3684 of the Revised Statutes (31 U.S.C. 529) when, in the judgment of the Secretary of the Interior, advance payments of initial expense are necessary to facilitate such work.

"Sec. 303. No part of any appropriated funds may be expended pursuant to authorization given by this Act for any scientific or technological research or development activity unless such expenditure is conditioned upon provisions determined by the Secretary of the Interior, with the approval of the Attorney General, to be effective to insure that all information, uses, products, processes, patents, and other developments resulting from that activity will (with such exceptions and limitations the Secretary may determine, after consultation with the Secretary of Defense, to be necessary in the interest of the national defense) be made freely and fully available to the general public. Nothing contained in this subsection shall deprive the owner of any background patent relating to any such activity of any rights which that owner may have under that patent.

"Sec. 304. There shall be established, in such agency and location as the President determines to be desirable, a center for cataloging current and projected scientific research in all fields of water resources. Each Federal agency doing water resources research shall cooperate by providing the cataloging center with information on work underway or scheduled by it. The cataloging center shall classify and maintain for general use a catalog of water resources research and investigation projects in progress or scheduled by all Federal agencies and by such non-Federal agencies of government, colleges, universities, private institutions, firms, and individuals as voluntarily may make such information available.

"Sec. 305. The President shall, by such means as he deems appropriate, clarify agency responsibilities for Federal water resources research and provide for interagency coordination of such research, including the research authorized by this Act. Such coordination shall include (a) continuing review of the adequacy of the Government-wide program in water resources research, (b) identification and elimination of duplication and overlaps between two or more agency

programs, (c) identification of technical needs in various water resources research categories, (d) recommendations with respect to allocation of technical effort among the Federal agencies, (e) review of technical manpower needs and findings concerning the technical manpower base of the program, (f) recommendations concerning management policies to improve the quality of the Government-wide research effort, and (g) actions to facilitate interagency communication at management levels.

"Sec. 306. As used in this Act, the term 'State' includes the Commonwealth of Puerto Rico."

And the House agree to the same.

Mr. LONG of Louisiana. Mr. President, I do not wish to unduly delay the conference report, except that I do wish to take advantage of this opportunity to congratulate the Senator for the magnificent job that he has done in handling this legislation from the very beginning.

This Senator was especially interested in seeing to it that Federal research money under this program could not be used under conditions under which certain private monopolists could use the Federal money for private patents and obtain monopoly rights that would cost the people of this Nation perhaps tens and hundreds of millions of dollars, which would be paying for a second time for research that they had already paid for.

The distinguished chairman of this committee studied this matter. He resisted the House position, in which the House tried to make us give away potentially valuable rights to private monopolists. He stood his ground in the conference. He even went to the extent of importuning House Members to study the merits of the amendment.

I congratulate the Senator. It was a magnificent job. The entire Nation is in the debt of the Senator.

Mr. ANDERSON. I thank the Senator from Louisiana for his comments.

WHAT CHIEF JUSTICE WARREN SAID IN 1948

Mr. WILLIAMS of Delaware. Mr. President, I ask unanimous consent to have printed at this point in the RECORD an editorial entitled "What Warren Said in 1948," published in the Washington Daily News of today.

There being no objection, the editorial was ordered to be printed in the RECORD, as follows:

[From the Washington Daily News, July 2, 1964]

WHAT WARREN SAID IN 1948

The U.S. News & World Report has dug up a speech Earl Warren gave in 1948, when he was Governor of California, directly opposing the views he and a majority of the Supreme Court have just written into law in the highly controversial State legislature reapportionment cases.

At the time, when Mr. Warren also was the Republican nominee for Vice President, California was considering a proposal to apportion the State senate by population—the procedure which the Warren Court majority ruled on June 15 of this year must be followed throughout the country.

Said Governor Warren on October 29, 1948, at Merced, Calif., according to U.S. News & World Report:

"Many California counties are far more important in the life of the State than their population bears to the entire population of the State. It is for this reason that I have never been in favor of restricting the representation in the senate to a strictly population basis.

"It is the same reason that the Founding Fathers of our country gave balanced representation to the States of the Union—equal representation in one house and proportionate representation based on population in the other.

"Moves have been made to upset the balanced representation in our State, even though it served us well and is strictly in accord with American tradition and the pattern of our National Government.

"There was a time when California was completely dominated by boss rule. The liberal election laws and legislative reapportionment of the system have liberated us from such domination. Any weakening of the laws would invite a return to boss rule which we are now happily rid of.

"Our State has made almost unbelievable progress under our present system of legislative representation. I believe we should keep it."

Governor Warren's views of 1948 made good sense, in our opinion, and still do—the 1964 U.S. Supreme Court decision to the contrary notwithstanding.

Mr. WILLIAMS of Delaware. He made more sense then than he does today.

NASA AUTHORIZATION BILL, FISCAL YEAR 1965—CONFERENCE REPORT

Mr. SYMINGTON. Mr. President, I submit a report of the committee of conference on the disagreeing votes of the two Houses on the amendments of the Senate to the bill (H.R. 10456) to authorize appropriations to the National Aeronautics and Space Administration for research and development, construction of facilities, and administrative operations, and for other purposes. I ask unanimous consent for the present consideration of the report.

The PRESIDING OFFICER. The report will be read for the information of the Senate.

The legislative clerk read the report.

(For conference report, see House proceedings of July 1, 1964, p. 15026, CONGRESSIONAL RECORD.)

The PRESIDING OFFICER. Is there objection to the present consideration of the report?

There being no objection, the Senate proceeded to consider the report.

Mr. SYMINGTON. Mr. President, I yield to the Senator from New Mexico.

Mr. ANDERSON. Mr. President, as chairman of the Committee on Aeronautical and Space Sciences, I think the able Senator from Missouri. I was detained in connection with the work in Alaska. I asked the able Senator from Missouri [Mr. SYMINGTON] to take charge of the hearings on the NASA authorization bill. With the assistance of the Senator from Maine [Mrs. SMITH] and others, he did a magnificent job. I thank him for the fine service which he rendered.

Mr. SYMINGTON. I deeply appreciate the remarks of the distinguished Senator from New Mexico, the chairman of the Committee on Aeronautics and

Page 2, line 12, strike out "1962" and insert "1963".

The SPEAKER. Is there objection to the request of the gentleman from New York?

Mr. WILLIAMS. Mr. Speaker, I object.

FOOD STAMP PROGRAM

Mr. COOLEY. Mr. Speaker, I ask unanimous consent for the immediate consideration of the bill (H.R. 10222) to strengthen the agricultural economy; to help to achieve a fuller and more effective use of food abundances; to provide for improved levels of nutrition among economically needy households through a cooperative Federal-State program of food assistance to be operated through normal channels of trade; and for other purposes.

The Clerk read the title of the bill.

The SPEAKER. Is there objection to the request of the gentleman from North Carolina?

Mr. WILLIAMS. Mr. Speaker, I object.

COMMITTEE ON EDUCATION AND LABOR

Mr. ROOSEVELT. Mr. Speaker, on behalf of the gentleman from Pennsylvania [Mr. HOLLAND], I ask unanimous consent that the Committee on Education and Labor have until midnight July 9 to file a report on the bill H.R. 11611, a matter which has been cleared with the gentleman from Indiana [Mr. BRUCE], who is the ranking member of the subcommittee.

The SPEAKER. Is there objection to the request of the gentleman from California?

Mr. WILLIAMS. Mr. Speaker, I object.

WATER RESOURCES RESEARCH CENTER

Mr. ASPINALL. Mr. Speaker, I call up the conference report on the bill S. 2 (to establish water resources research centers at land-grant colleges and State universities, to stimulate water research at other colleges, universities, and centers of competence, and to promote a more adequate national program of water research, and ask unanimous consent that the statement of the managers on the part of the House be read in lieu of the report.

The Clerk read the title of the bill.

The SPEAKER. Is there objection to the request of the gentleman from Colorado?

There was no objection.

The Clerk read the statement.

(For conference report and statement see proceedings of the House of June 30, 1964.)

The SPEAKER. Without objection, the conference report is agreed to.

Mr. WILLIAMS. Mr. Speaker, I object.

The SPEAKER. The question is on the conference report.

The question was taken; and the Speaker announced that the "ayes" appeared to have it.

Mr. WILLIAMS. Mr. Speaker, I object to the vote on the ground that a quorum is not present and make the point of order that a quorum is not present.

The SPEAKER. Evidently a quorum is not present.

The Doorkeeper will close the doors, the Sergeant at Arms will notify absent Members, and the Clerk will call the roll.

The question was taken; and there were—yeas 347, nays 0, not voting 85, as follows:

[Roll No. 182]

YEAS—347

Abeie	Derwinski	Hull
Abernethy	Devine	Hutchinson
Adair	Dingell	Ichord
Addabbo	Dole	Jarman
Albert	Dorn	Jennings
Andrews, Ala.	Dowdy	Joelson
Andrews, N. Dak.	Downing	Johansen
Ashbrook	Duiski	Johnson, Calif.
Aspinall	Duncan	Johnson, Pa.
Ayres	Dwyer	Jonas
Baldwin	Edmondson	Jones, Ala.
Baring	Edwards	Karsten
Barry	Elliott	Kastenmeier
Bates	Ellsworth	Keith
Battin	Faion	Keogh
Beckworth	Farbstein	Kilgore
Beermann	Fasceii	King, Calif.
Bell	Feighan	King, N.Y.
Bennett, Fla.	Findley	Kluczynski
Betts	Fisher	Knox
Biatnik	Flood	Kornegay
Boggs	Flynt	Kunkel
Boland	Fogarty	Kyl
Bolton	Ford	Laird
Frances P. Bolton	Foreman	Landrum
Oliver P. Bonner	Forrester	Langen
Bow	Fountain	Latta
Brademas	Fraser	Leggett
Bray	Friedel	Lennon
Brock	Fulton, Pa.	Libonati
Bromwell	Fulton, Tenn.	Lindsay
Brooks	Fuqua	Lipscomb
Broomfield	Gallagher	Long, La.
Brotzman	Garmatz	McClary
Brown, Calif.	Gary	McCulloch
Brown, Ohio	Glaimo	McDade
Broyhill, N.C.	Gibbons	McDowell
Broyhill, Va.	Gilbert	McFall
Bruce	Gill	McIntire
Burke	Glenn	McLoskey
Burkhaite	Gonzalez	McMillan
Burleson	Goodell	Madden
Burton, Calif.	Goodling	Mahon
Burton, Utah	Grabowski	Marsh
Byrne, Pa.	Grant	Martin, Calif.
Byrnes, Wis.	Gray	Martin, Mass.
Cahill	Green, Oreg.	Mathias
Cameron	Green, Pa.	Matsunaga
Carey	Griffin	Matthews
Casey	Griffiths	May
Cederberg	Gross	Meador
Chamberlain	Grover	Michel
Cheif	Gubser	Miller, Calif.
Chenoweth	Gurney	Minish
Clancy	Hagan, Ga.	Minshall
Clausen, Don H.	Hagen, Calif.	Monagan
Clawson, Del.	Haley	Montoya
Cleveland	Hall	Moore
Cohelan	Halleck	Moorhead
Collier	Halpern	Morgan
Coimer	Hanna	Morris
Conte	Hansen	Morrison
Cooley	Harding	Morse
Corbett	Hardy	Morton
Corman	Harsha	Mosher
Cramer	Harvey, Ind.	Moss
Cunningham	Harvey, Mich.	Muiter
Curtin	Hawkins	Murphy, Ill.
Daddario	Hechler	Murphy, N.Y.
Dague	Henderson	Murray
Daniels	Herion	Natcher
Davis, Tenn.	Hoeven	Nedzi
Dawson	Hoffield	Nelsen
	Horan	Nix
	Horton	O'Brien, N.Y.
	Hosmer	O'Hara, Ill.
	Huddieston	O'Hara, Mich.

O'Konski	Rostenkowski	Taft
Olsen, Mont.	Roudebush	Talcott
Olson, Minn.	Roush	Teague, Calif.
O'Neill	Roybal	Teague, Tex.
Ostertag	Ryan, Mich.	Thomas
Patten	Ryan, N.Y.	Thompson, La.
Pelly	St. George	Thompson, N.J.
Pepper	St. Germain	Thompson, Tex.
Perkins	St. Onge	Thomson, Wis.
Pickle	Saylor	Tollefson
Pike	Schadeberg	Trimble
Pillion	Schenck	Tuck
Pirnie	Schneebeil	Tupper
Poage	Schweiker	Tuten
Pool	Schwengel	Udall
Price	Scott	Ullman
Pucinski	Secrest	Van Deerin
Purcell	Selden	Vanik
Quie	Senner	Van Pelt
Quillen	Sheppard	Waggoner
Randall	Shipley	Waihauser
Reid, Ill.	Short	Watts
Reid, N.Y.	Shriver	Weaver
Reifel	Sickles	Weitner
Reuss	Sikes	Westland
Rhodes, Ariz.	Siler	Whalley
Rich	Sisk	White
Riehlman	Skubitz	Whitener
Rivers, Alaska	Slack	Whitten
Rivers, S.C.	Smith, Va.	Wickersham
Roberts, Ala.	Snyder	Widnall
Roberts, Tex.	Springer	Williams
Robison	Staabler	Wilson,
Rodino	Stafford	Charles H.
Rogers, Colo.	Steed	Winstead
Rogers, Fla.	Stephens	Wright
Rooney, N.Y.	Stinson	Wyman
Rooney, Pa.	Stratton	Young
Roosevelt	Stubblefield	Younger
Rosenthal	Sullivan	Zablocki

NAYS—0

NOT VOTING—85

Abbott	Finnegan	Mills
Alger	Fino	Norblad
Anderson	Frelinghuysen	Osmers
Arends	Gathings	Passman
Ashley	Harris	Patman
Ashmore	Harrison	Philbin
Auchincloss	Hays	Pitcher
Avery	Healey	Poff
Baker	Hébert	Powell
Barrett	Hoffman	Rains
Bass	Holland	Rhodes, Pa.
Becker	Jensen	Rogers, Tex.
Belcher	Johnson, Wis.	Rumsfeld
Bennett, Mich.	Jones, Mo.	Sibal
Berry	Karth	Smith, Calif.
Bolling	Kee	Smith, Iowa
Buckley	Kelly	Staggers
Celler	Kilburn	Taylor
Clark	Kirwan	Toll
Curtis	Lankford	Utt
Davis, Ga.	Lesinski	Vinson
Deaney	Lloyd	Watson
Dent	Long, Md.	Wharton
Denton	Macdonald	Willis
Derounian	MacGregor	Wilson, Bob
Diggs	Mallard	Wilson, Ind.
Donohue	Martin, Nebr.	Wydler
Everett	Miller, N.Y.	
Evins	Miliken	

So the conference report was agreed to. The Clerk announced the following pairs:

Until further notice:

Mr. Hébert with Mr. Fino.
 Mr. Karth with Mrs. Baker.
 Mr. Barrett with Mr. Arends.
 Mr. Hays with Mr. Harrison.
 Mr. Philbin with Mr. Jensen.
 Mr. Donohue with Mr. Auchincloss.
 Mr. Macdonald with Mr. Poff.
 Mr. Evins with Mr. Norblad.
 Mr. Finnegan with Mr. Siball.
 Mr. Rhodes of Pennsylvania with Mr. Osmers.
 Mr. Rogers of Texas with Mr. MacGregor.
 Mr. Willis with Mr. Bennett of Michigan.
 Mr. Thompson of Louisiana with Mr. Derounian.
 Mrs. Kelly with Mr. Frelinghuysen.
 Mr. Long of Louisiana with Mr. Bob Wilson.
 Mr. Clark with Mr. Alger.
 Mr. Passman with Mr. Belcher.

Mr. Rains with Mr. Martin of Nebraska.
 Mr. Patman with Mr. Rumsfeld.
 Mr. Harris with Mr. Wydler.
 Mr. Vinson with Mr. Smith of California.
 Mr. Ashmore with Mr. Berry.
 Mr. Bass with Mr. Curtis.
 Mr. Davis of Georgia with Mr. Utt.
 Mr. Ashley with Mr. Wilson of Indiana.
 Mr. Delaney with Mr. Mailliard.
 Mr. Dent with Mr. Wharton.
 Mr. Abbitt with Mr. Kilburn.
 Mr. Denton with Mr. Hoffman.
 Mr. Kirwan with Mr. Becker.
 Mr. Johnson of Wisconsin with Mr. Miller of New York.
 Mr. Everett with Mr. Avery.
 Mr. Gathings with Mr. Milliken.
 Mr. Mills with Mr. Toll.
 Mr. Pilcher with Mr. Celler.
 Mr. Powell with Mr. Holland.
 Mr. Staggers with Mr. Lankford.
 Mr. Watson with Mr. Buckley.
 Mr. Smith of Iowa with Mrs. Kee.
 Mr. Lesinski with Mr. Diggs.
 Mr. Jones of Missouri with Mr. Healey.

The result of the vote was announced as above recorded.

The doors were opened.

A motion to reconsider was laid on the table.

Mr. ASPINALL. Mr. Speaker, I would like to explain briefly the changes in the House-passed language in S. 2 resulting from the agreements reached in the committee on conference. For the most part the House language prevailed. The House language was used as the basis for markup in the committee on conference and only four changes were made thereto.

The House-passed bill limited the life of the program under title I, which establishes State water resources research institutes, to 10 years in order that there might be a review of the program to determine whether it was providing the water research expected and whether modifications in the program were needed. The committee on conference agreed to authorizing a permanent program with the understanding that it would be reviewed periodically by the legislative committees. The statement of managers on the part of the House carries a direction to the Secretary of the Interior to keep the Congress fully informed with respect to the program.

The second change in House language involved the designation of institutions to receive grants. The Senate-passed bill would have permitted the designation of a land-grant college and one or more other institutions in each State to receive grants for the establishment of research institutes.

The House language provided for establishing water resources research institutes at only one college or university in each State, with such institute to be established at the land-grant college unless otherwise provided by an act of the State legislature. The committee on conference agreed with the House language limiting the number of institutes to not more than one in each State, but the language permitting the State legislature to designate some other institution in lieu of the land-grant college was changed somewhat to make it a little easier for the State legislature to assume this responsibility if it chose to do so. Under the language agreed upon the land-grant college would still

be designated automatically unless the State legislature acted to designate some other institution. Where there are two land-grant colleges in one State, the Governor, in the absence of a designation by the State legislature, could make the designation as between the two.

The third change in the House-approved language relates to the additional water resources research programs that would have been authorized under title II in the Senate-passed bill. In the Senate-passed bill these programs involve the appropriation of \$5 million in the first year, increasing to \$10 million in the sixth year and thereafter. The House-approved language deleted this title entirely.

The committee of conference agreed to retain the additional water resources research programs described in title II of the Senate-passed bill but to limit the amounts authorized to be appropriated to \$1 million a year for a period of 10 years, with the further provision that any proposed grant, contract, or other arrangement under the authority given in this title would have to be reported to the Congress for a 60-day review period and funds could be appropriated for implementation only if, during this review period, neither of the legislative committees disapproved.

The fourth change in the House-approved language relates to patents in connection with the research work authorized. The committee on conference accepted the Senate language providing that no part of the funds made available under the act could be expended for research work unless the expenditures were conditioned upon provisions which insure that all information, uses, products, processes, patents, and so forth, would be made fully and freely available to the public.

The committee on conference retained the language which the House added to the Senate-passed bill directing the establishment of some effective means for clarifying Federal agency responsibilities in water resources research and providing effective interagency coordination of such research. This provision in the House bill which goes to all water resources research within the Federal establishment was considered by our committee as one of the most important provisions in the bill. We believe it will result in substantial savings and will eliminate duplication of research effort.

Mr. SAYLOR. Mr. Speaker, I am glad to report to the House my satisfaction with S. 2 as it has emerged from the conference committee. The reasonableness with which the conferees approached their task and resolved the differences between the House and Senate versions of this bill is apparent in the results.

I am particularly pleased with two features of the bill as it will go to the President. First, in restoring a part of the bill that had been stricken, language was added which will make it possible for the Congress to exercise control over the carrying out of the program authorized in title II. Appropriations will not be made for any grant or contract under this title until the proposal has laid be-

fore the Committees on Interior and Insular Affairs of the House and Senate for 60 days, and either of these committees may disapprove the proposal if it finds reason to do so.

The second is the retention of the House-sponsored language relating to coordination of water resource research activities of the Federal agencies. We have altogether too many downtown agencies operating independently in this field. We want results and we need results from water research but we do not want a continuous scramble among the agencies—the Public Health Service, the Corps of Engineers, the Bureau of Reclamation, the Soil Conservation Service, the Fish and Wildlife Service, the Geological Survey, the Forest Service, the Weather Bureau, the National Science Foundation, and a whole host of others—to outdo each other. We need to cover the whole field, to do so in a planful and systematic way, and to be sure that nothing is left undone that ought to be done and nothing done that ought not to be done. Above all we do not want wasteful duplication. Here is the nub of the problem. Section 305, I am glad to say, gives the President a tool to enforce order among the agencies. It gives him a power that must be used wisely and forcefully. If this is done, the benefits that will flow to the American people from S. 2 will be immeasurable and the pattern that is here set up for water research will be followed in other fields where similar problems exist.

Mr. PICKLE. Mr. Speaker, I rise to speak in favor of the conference report regarding S. 2. The conferees have worked hard on this matter, and I believe have come up with what is the best we could hope for under the circumstances. When this bill was originally discussed in the House, I objected because the language was so strict that it made any grant for a water resources project automatically to be designated for a land-grant college. This would have practically eliminated the possibility of the University of Texas, which has an excellent water resources project underway now, to have participated in these grants. This conference report does soften that language some and makes these grants available to "land-grant schools or some other institution designated by act of the legislature." It also provides that one school can cooperate with another school in the same State to carry out the purposes of the act.

Title II has been reinserted in this bill and this provides at least \$1 million per year for a total of 9 years wherein educational institutions—other than those establishing institutions under title I of this act—can undertake research into any aspect of water problems which may be related to the mission of the Department of Interior.

While this bill does not give those institutions other than land-grant schools throughout the country the exact language they want, I do believe it is a reasonable compromise. I can envision that Texas A & M University and the University of Texas, both excellent schools, can work together closely in this

broad and important field of water research.

Mr. DADDARIO. Mr. Speaker, I am disappointed that the Water Resources Research Act of 1964, S. 2, agreed to by the conferees, contains the original Senate language with regard to patents.

You will recall that in passing the bill, the House amended S. 2 to delete this language and insert a provision calling for those administering research and development to adhere to the Statement of Government Patent Policy promulgated by the late President Kennedy last October, which is fully supported by President Johnson.

The controversy over the disposition of inventions made in the performance of Government-financed research is not a new one, and, in fact, has grown over the years as the Government has become involved in more and more technical effort.

From a position of not more than 4 years ago, when industry and Government were poles apart on their views, substantial progress has been made through the normal, although admittedly slow, legislative process, aided by changes in administrative regulations.

Largely through comprehensive hearings held by the Subcommittee on Patents and Scientific Inventions, which I had the honor to chair, on legislation to amend the patent provisions of the 1958 Space Act, and hearings on governmentwide patent policy before the Senate Judiciary Subcommittee on Patents, Trademarks, and Copyrights, there evolved a much better understanding of the equities involved in Government research and development contracting with private industry, universities, and other research organizations.

One point on which there was general agreement is that Government patent policy must assure the Government of fulfilling objectives of its technical efforts, whether these be a new missile system, a large booster capability for space exploration, new processes of water purification, or methods of purifying the air we breathe, to mention but a few. In order that these, and other research and development objectives, may be accomplished quickly and at realistic cost the Government must be in a position to attract the best technical competence available, whether it be a private industry or the university. We must take into consideration the experience, background, knowledge, and technical capability required for the solution of highly complex technical problems.

It is generally recognized that patent ownership is a very complex subject and one that does not lend itself to easy solution. The varying equities involved in government-industry relationships require a great deal of flexibility and at times detailed negotiation.

Recognizing all these factors and being fully aware that a legislative solution to the overall problem of Government patent policy would be a long time developing, the President issued a statement of policy for the guidance of agencies not covered by law. The policy was developed with the advice of his Science Adviser, and with the cooperation of all Federal departments and agencies. I

have spoken on this policy on several occasions in the past—to commend the President for issuing it and when the House rejected restrictive patent language in the Clean Air Act.

The President did not intend that the statement of policy would provide the final solution to the problem. He included a mechanism for review and revision, base on experience, after careful study by the Federal Council for Science and Technology. A patent advisory panel has been formed to work with agencies in the the promulgation of implementing regulations and to study the results of contractual experience. Even now every effort is being made to see that the intent of the President's policy is carried out, with due consideration of the varying governmental missions and research needs.

The Bureau of the Budget has asked that governmentwide patent policy legislation not be passed until Federal agencies have gained experience under the policy statement and a record of performance established.

It is my sincere conviction that progress in the development of reasonable and equitable Government patent policy will be retarded by the continued adoption of restrictive patent provisions such as contained in S. 2. This language is at best ambiguous. Legal authorities have argued since its first adoption in the Helium and Coal Research Acts that they could not understand what "fully and freely available to the general public" meant. The Department of Interior has interpreted this to mean outright Government ownership of all inventions, regardless of the equities involved or the amount of public as contrasted with private, investment involved. Moreover, it has been brought to my attention on several occasions that this language has also been interpreted by the Interior Department as justification for demanding background patents—in spite of the fact that this is specifically prohibited.

Adoption of the Senate language will lead to delay in much-needed water resources research and to increased cost to the Government. This has been the experience under other research programs in agencies bound by restrictive patent provisions. An example is the National Aeronautics and Space Administration. This was borne out in two separate reports by the Committee on Science and Astronautics in reporting legislation to amend the patent provisions of the Space Act. In 1960 the House, acting on the committee's recommendation, passed this legislation. The Senate failed to act.

Of even greater significance, this language is not in keeping with the President's policy. In a letter to the Chairman of the House and Senate Interior Committees, Mr. Phillip S. Hughes, assistant director for Legislative Reference, Bureau of the Budget, stated:

As reported by your committee, the pertinent provisions of section 203 (section 303 of the bill) would inhibit the desirable flexibility of the administration's policy with respect to patent rights and we, therefore, recommend the deletion of those provisions from S. 2.

Mr. Speaker, the manner in which the conference report on S. 2 has been brought before the House, without opportunity to discuss the important patent provisions, is deplorable.

I do not want to belabor this point. I have stated my position on this matter as forcefully as possible under the circumstances in the hope that this will alert the Members of the House to the dangers of adopting the Senate patent language.

This is contrary to the traditional position of the House which has either initiated provisions consistent with the administration's flexible position or has rejected title provisions inserted by the other body.

The time will come when Congress will face up to its responsibilities and enact a governmentwide policy. Until this happens, I would urge that no further attempts be made to restrict Federal research programs and that the House support the President's efforts to arrive at a reasonable solution.

COMMITTEE ON EDUCATION AND LABOR

Mr. ROOSEVELT. Mr. Speaker, I renew my request, on behalf of the gentleman from Pennsylvania [Mr. HOLLAND], that the Committee on Education and Labor may have until midnight July 9 to file a report on H.R. 11611. This matter has been cleared.

The SPEAKER. Is there objection to the request of the gentleman from California?

There was no objection.

TO INCORPORATE THE AVIATION HALL OF FAME

Mr. FORRESTER. Mr. Speaker, I ask unanimous consent to take from the Speaker's desk the bill (H.R. 8590) to incorporate the Aviation Hall of Fame, with Senate amendments thereto, and concur in the Senate amendments.

The Clerk read the title of the bill.

The Clerk read the Senate amendments, as follows:

Page 2, line 4, strike out "Kerchner" and insert "Kercher".

Page 2, lines 14 and 15, strike out "A. M. Pride, Dover-Foxcroft, Maine;"

Page 2, line 20, strike out "Truner" and insert "Turner".

The SPEAKER. Is there objection to the request of the gentleman from Georgia?

Mr. WILLIAMS. Mr. Speaker, reserving the right to object, I have been objecting to these late afternoon unanimous-consent requests for the passage of legislation, some of which has been minor legislation and some of which has been rather far reaching. The particular bill which is presently before the House, as I understand it, would merely grant a Federal charter to a group in Ohio; is that correct?

Mr. FORRESTER. That is correct.

Mr. WILLIAMS. For the purpose of setting up an air museum into which there will be no Federal money. Is that correct?

Mr. FORRESTER. Not only no Federal money but let me say it has already been passed by the House. This is simply to concur in a Senate amendment which simply changes the name of a person erroneously placed in the bill.

Mr. WILLIAMS. The gentleman has previously explained the bill to me and I shall not object at this time.

The SPEAKER. Is there objection to the request of the gentleman from Georgia?

There was no objection.

The Senate amendment was concurred in.

A motion to reconsider was laid on the table.

AMEND INTERNAL REVENUE CODE OF 1954

Mr. KEOGH. Mr. Speaker, on behalf of the gentleman from Arkansas [Mr. MILLS], chairman of the Committee on Ways and Means, I ask unanimous consent to take from the Speaker's desk the bill (H.R. 6455), to amend subsection (b) of section 512 of the Internal Revenue Code of 1954—dealing with unrelated business taxable income—with Senate amendment thereto, and concur in the Senate amendment.

The Clerk read the title of the bill.

The Clerk read the Senate amendment, as follows:

Page 2, line 12, strike out "1962" and insert "1963".

The SPEAKER. Is there objection to the request of the gentleman from New York?

Mr. WILLIAMS. Mr. Speaker, I reserve the right to object. A few moments ago I objected to the consideration of this bill in line with the statement that I just made. The bill has been explained to me as being one of an emergency nature. If it is not passed at this time I understand that damage may result. Therefore, I will withdraw my objection.

The SPEAKER. Is there objection to the request of the gentleman from New York?

There was no objection.

The Senate amendment was concurred in.

A motion to reconsider was laid on the table.

(Mr. MILLS (at the request of Mr. KEOGH) was given permission to extend his remarks at this point in the RECORD.)

Mr. MILLS. Mr. Speaker, as the Members will recall, as passed unanimously by the House on April 14, 1964, H.R. 6455 provided an exemption from the tax on unrelated business taxable income in the case of labor unions and agricultural or horticultural organizations where certain

conditions are met. These conditions were that, first, the income must be used to establish, maintain, or operate a retirement home, hospital, or similar facility for the exclusive use of aged and infirm members of the labor union or agricultural or horticultural organization; second, the income must be derived from agricultural pursuits conducted on ground contiguous to the home, hospital, and so forth; and third, this income may not represent more than 75 percent of the cost of maintaining and operating the home, and so forth.

The bill was passed by the other body with one amendment only, relating to the effective date of the bill. Under the Senate amendment, the provisions of the bill would apply with respect to taxable years beginning after December 31, 1963, instead of taxable years beginning after December 31, 1962, as provided in the House-passed bill.

I urge that the House accept the amendment of the Senate.

NASA AUTHORIZATION FOR FISCAL YEAR 1965

Mr. MILLER of California. Mr. Speaker, I call up the conference report on the bill (H.R. 10456) to authorize appropriations to the National Aeronautics and Space Administration for research and development, construction of facilities, and administrative operations, and for other purposes, and ask unanimous consent that the statement of the managers on the part of the House be read in lieu of the report.

The Clerk read the title of the bill.

The SPEAKER. Is there objection to the request of the gentleman from California?

There was no objection.

The Clerk read the statement.

(For conference report and statement see proceedings of the House of July 1, 1964.)

Mr. FULTON of Pennsylvania. Mr. Speaker, the results of the conference on H.R. 10456, the 1965 space authorization bill, follow the policy of our House Science and Astronautics Committee in strictly evaluating NASA budgetary needs.

The House conferees went to the conference fully aware that the Senate conferees had been guided by the more lenient policy of the Senate Space Committee in the restoration to NASA of better than \$52 million. NASA originally requested \$5,304 million. The House on the recommendation and report of the House Science and Astronautics Committee reduced this by \$110,189,500 to a total of \$5,193,810,500, the amount passed by the House.

I should point out that the House committee action was based upon information given in testimony during the early part of this year. As the Members well know, technology moves at such a rapid pace today that considerable change in projects and programs can occur in a few months.

To some degree this is the case with regard to the Senate committee action. The Senate committee received testimony from NASA at a later date than the House Committee. This testimony contained new information that, to a modest degree, modified the House committee position.

The House conferees, therefore, agreed to restore to NASA \$33,695,500 of the \$110 million originally eliminated. Restoration mostly resulted from more specific planning and programming and introduction of new information pertaining to more recent progress in specific programs.

In any event, the original NASA request has been reduced by \$76,494,000, which is a substantial saving, without hurting the space program. It is personally awarding to me to have been part of the people in the House working to save this \$76,494,000 during the coming fiscal year, for the American taxpayers.

We have attempted to provide NASA with the money adequate to fulfill its objectives. At the same time, we have tried to impress upon NASA the need for strict and economic procedures.

In a real way, NASA has been experiencing the critical review of the House Science and Astronautics Committee through its NASA Oversight Subcommittee. I need only to point to what the subcommittee has done to improve the Centaur program. More recently, its investigation into the Ranger program has already produced marked managerial improvements in NASA. Such activities inevitably result in efficiency and in the eventual reductions in cost. I cite these only to show the committee's continuing concern with the efficiency of NASA management and the judicious expenditures of its funds.

I believe the results of the conference are realistic and reasonable. The House in good conscience should have no difficulty in agreeing to the acceptance of the conference report. As a conferee, I signed the unanimous conference report, and favor passage of this conference report.

In order that the Members will have complete and adequate information on the legislative action taken at this time on the NASA fiscal year 1965 authorization, I submit to the House the following figures:



An Act

78 STAT. 329

To establish water resources research centers, to promote a more adequate national program of water research, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That (a) this Act may be cited as the "Water Resources Research Act of 1964."

Water Re-
sources Re-
search Act
of 1964.

(b) In order to assist in assuring the Nation at all times of a supply of water sufficient in quantity and quality to meet the requirements of its expanding population, it is the purpose of the Congress, by this Act, to stimulate, sponsor, provide for, and supplement present programs for the conduct of research, investigations, experiments, and the training of scientists in the fields of water and of resources which affect water.

TITLE I—STATE WATER RESOURCES RESEARCH INSTITUTES

SEC. 100. (a) There are authorized to be appropriated to the Secretary of the Interior for the fiscal year 1965 and each subsequent year thereafter sums adequate to provide \$75,000 to each of the several States in the first year, \$87,500 in each of the second and third years, and \$100,000 each year thereafter to assist each participating State in establishing and carrying on the work of a competent and qualified water resources research institute, center, or equivalent agency (hereinafter referred to as "institute") at one college or university in that State, which college or university shall be a college or university established in accordance with the Act approved July 2, 1862 (12 Stat. 503), entitled "An Act donating public lands to the several States and territories which may provide colleges for the benefit of agriculture and the mechanic arts" or some other institution designated by Act of the legislature of the State concerned: *Provided*, That (1) if there is more than one such college or university in a State, established in accordance with said Act of July 2, 1862, funds under this Act shall, in the absence of a designation to the contrary by act of the legislature of the State, be paid to the one such college or university designated by the Governor of the State to receive the same subject to the Secretary's determination that such college or university has, or may reasonably be expected to have, the capability of doing effective work under this Act; (2) two or more States may cooperate in the designation of a single interstate or regional institute, in which event the sums assignable to all of the cooperating States shall be paid to such institute; and (3) a designated college or university may, as authorized by appropriate State authority, arrange with other colleges and universities within the State to participate in the work of the institute.

Appropriation.

7 USC 301-
308.

(b) It shall be the duty of each such institute to plan and conduct and/or arrange for a component or components of the college or university with which it is affiliated to conduct competent research, investigations, and experiments of either a basic or practical nature, or both, in relation to water resources and to provide for the training of scientists through such research, investigations, and experiments. Such research, investigations, experiments, and training may include, without being limited to, aspects of the hydrologic cycle; supply and demand for water; conservation and best use of available supplies of water; methods of increasing such supplies; and economic, legal, social, engineering, recreational, biological, geographic, ecological, and other aspects of water problems, having due regard to the varying conditions

and needs of the respective States, to water research projects being conducted by agencies of the Federal and State Governments, the agricultural experiment stations, and others, and to avoidance of any undue displacement of scientists and engineers elsewhere engaged in water resources research.

Matching funds.

SEC. 101. (a) There is further authorized to be appropriated to the Secretary of the Interior for the fiscal year 1965 and each subsequent year thereafter sums not in excess of the following: 1965, \$1,000,000; 1966, \$2,000,000; 1967, \$3,000,000; 1968, \$4,000,000; and 1969 and each of the succeeding years, \$5,000,000. Such moneys when appropriated, shall be available to match, on a dollar-for-dollar basis, funds made available to institutes by States or other non-Federal sources to meet the necessary expenses of specific water resources research projects which could not otherwise be undertaken, including the expenses of planning and coordinating regional water resources research projects by two or more institutes.

Applications
for grants.

(b) Each application for a grant pursuant to subsection (a) of this section shall, among other things, state the nature of the project to be undertaken, the period during which it will be pursued, the qualifications of the personnel who will direct and conduct it, the importance of the project to the water economy of the Nation, the region, and the State concerned, its relation to other known research projects theretofore pursued or currently being pursued, and the extent to which it will provide opportunity for the training of water resources scientists. No grant shall be made under said subsection (a) except for a project approved by the Secretary, and all grants shall be made upon the basis of the merit of the project, the need for the knowledge which it is expected to produce when completed, and the opportunity it provides for the training of water resources scientists.

Payments.

SEC. 102. Sums available to the States under the terms of sections 100 and 101 of this Act shall be paid to their designated institutes at such times and in such amounts during each fiscal year as determined by the Secretary, and upon vouchers approved by him. Each institute shall have an officer appointed by its governing authority who shall receive and account for all funds paid under the provisions of this Act and shall make an annual report to the Secretary on or before the 1st day of September of each year, on work accomplished and the status of projects underway, together with a detailed statement of the amounts received under any of the provisions of this Act during the preceding fiscal year, and of its disbursement, on schedules prescribed by the Secretary. If any of the moneys received by the authorized receiving officer of any institute under the provisions of this Act shall by any action or contingency be found by the Secretary to have been improperly diminished, lost, or misapplied, it shall be replaced by the State concerned and until so replaced no subsequent appropriation shall be allotted or paid to any institute of such State.

Funds for
printing, etc.

SEC. 103. Moneys appropriated pursuant to this Act, in addition to being available for expenses for research, investigations, experiments, and training conducted under authority of this Act, shall also be available for printing and publishing the results thereof and for administrative planning and direction. The institutes are hereby authorized and encouraged to plan and conduct programs financed under this Act in cooperation with each other and with such other agencies and individuals as may contribute to the solution of the water problems involved, and moneys appropriated pursuant to this Act shall be available for paying the necessary expenses of planning, coordinating, and conducting such cooperative research.

SEC. 104. The Secretary of the Interior is hereby charged with the responsibility for the proper administration of this Act and, after full consultation with other interested Federal agencies, shall prescribe such rules and regulations as may be necessary to carry out its provisions. He shall require a showing that institutes designated to receive funds have, or may reasonably be expected to have, the capability of doing effective work. He shall furnish such advice and assistance as will best promote the purposes of this Act, participate in coordinating research initiated under this Act by the institutes, indicate to them such lines of inquiry as to him seem most important, and encourage and assist in the establishment and maintenance of cooperation by and between the institutes and between them and other research organizations, the United States Department of the Interior, and other Federal establishments.

Secretary of the Interior, responsibility.

On or before the 1st day of July in each year after the passage of this Act, the Secretary shall ascertain whether the requirements of section 102 have been met as to each State, whether it is entitled to receive its share of the annual appropriations for water resources research under section 100 of this Act, and the amount which it is entitled to receive.

The Secretary shall make an annual report to the Congress of the receipts and expenditures and work of the institutes in all States under the provisions of this Act. His report shall indicate whether any portion of an appropriation available for allotment to any State has been withheld and, if so, the reasons therefor.

Report to Congress.

SEC. 105. Nothing in this Act shall be construed to impair or modify the legal relation existing between any of the colleges or universities under whose direction an institute is established and the government of the State in which it is located, and nothing in this Act shall in any way be construed to authorize Federal control or direction of education at any college or university.

TITLE II—ADDITIONAL WATER RESOURCES RESEARCH PROGRAMS

SEC. 200. There is authorized to be appropriated to the Secretary of the Interior \$1,000,000 in fiscal year 1965 and \$1,000,000 in each of the nine fiscal years thereafter from which he may make grants, contracts, matching, or other arrangements with educational institutions (other than those establishing institutes under title I of this Act), private foundations or other institutions; with private firms and individuals; and with local, State and Federal Government agencies, to undertake research into any aspects of water problems related to the mission of the Department of the Interior, which may be deemed desirable and are not otherwise being studied. The Secretary shall submit each such proposed grant, contract, or other arrangement to the President of the Senate and the Speaker of the House of Representatives, and no appropriation shall be made to finance the same until 60 calendar days (which 60 days, however, shall not include days on which either the House of Representatives or the Senate is not in session because of an adjournment of more than three calendar days) after such submission and then only if, within said 60 days, neither the Committee on Interior and Insular Affairs of the House of Representatives nor the Committee on Interior and Insular Affairs of the Senate disapproves the same.

Proposed grants, etc. Transmittal to Congress.

TITLE III—MISCELLANEOUS PROVISIONS

Cooperation of
Government
agencies.

Availability of
information.

SEC. 300. The Secretary of the Interior shall obtain the continuing advice and cooperation of all agencies of the Federal Government concerned with water problems, of State and local governments, and of private institutions and individuals, to assure that the programs authorized in this Act will supplement and not duplicate established water research programs, to stimulate research in otherwise neglected areas, and to contribute to a comprehensive, nationwide program of water and related resources research. He shall make generally available information and reports on projects completed, in progress, or planned under the provisions of this Act, in addition to any direct publication of information by the institutes themselves.

SEC. 301. Nothing in this Act is intended to give or shall be construed as giving the Secretary of the Interior any authority or surveillance over water resources research conducted by any other agency of the Federal Government, or as repealing, superseding, or diminishing existing authorities or responsibilities of any agency of the Federal Government to plan and conduct, contract for, or assist in research in its areas of responsibility and concern with water resources.

SEC. 302. Contracts or other arrangements for water resources work authorized under this Act with an institute, educational institution, or non-profit organization may be undertaken without regard to the provisions of section 3684 of the Revised Statutes (31 U.S.C. 529) when, in the judgment of the Secretary of the Interior, advance payments of initial expense are necessary to facilitate such work.

SEC. 303. No part of any appropriated funds may be expended pursuant to authorization given by this Act for any scientific or technological research or development activity unless such expenditure is conditioned upon provisions determined by the Secretary of the Interior, with the approval of the Attorney General, to be effective to insure that all information, uses, products, processes, patents, and other developments resulting from that activity will (with such exceptions and limitations as the Secretary may determine, after consultation with the Secretary of Defense, to be necessary in the interest of the national defense) be made freely and fully available to the general public. Nothing contained in this section shall deprive the owner of any background patent relating to any such activity of any rights which that owner may have under that patent.

Cataloging
center.

SEC. 304. There shall be established, in such agency and location as the President determines to be desirable, a center for cataloging current and projected scientific research in all fields of water resources. Each Federal agency doing water resources research shall cooperate by providing the cataloging center with information on work underway or scheduled by it. The cataloging center shall classify and maintain for general use a catalog of water resources research and investigation projects in progress or scheduled by all Federal agencies and by such non-Federal agencies of government, colleges, universities, private institutions, firms, and individuals as voluntarily may make such information available.

Agency respon-
sibilities.
Presidential
action.

SEC. 305. The President shall, by such means as he deems appropriate, clarify agency responsibilities for Federal water resources research and provide for interagency coordination of such research, including the research authorized by this Act. Such coordination shall include (a) continuing review of the adequacy of the Government-wide program in water resources research, (b) identification and

elimination of duplication and overlaps between two or more agency programs, (c) identification of technical needs in various water resources research categories, (d) recommendations with respect to allocation of technical effort among the Federal agencies, (e) review of technical manpower needs and findings concerning the technical manpower base of the program, (f) recommendations concerning management policies to improve the quality of the Government-wide research effort, and (g) actions to facilitate interagency communication at management levels.

SEC. 306. As used in this Act, the term "State" includes the Commonwealth of Puerto Rico. "State."

Approved July 17, 1964.

LEGISLATIVE HISTORY:

HOUSE REPORTS: No. 1136 (Comm. on Interior & Insular Affairs) and No. 1526 (Comm. of Conference).

SENATE REPORT No. 117 (Comm. on Interior and Insular Affairs).

CONGRESSIONAL RECORD:

Vol. 109 (1963): Apr. 22, considered in Senate.

Apr. 23, considered and passed Senate.

Vol. 110 (1964): June 2, considered and passed House, amended.

July 2, House and Senate agreed to conference report.

